5 Results

5.1 Incidence of the clubfoot

In the years 1963—78, 67054 living babies were born in the CHT. Of these babies 66 had a clubfoot. Thus, on the basis of the babies born in the CHT, the incidence of TEV in the area of Tampere was estimated at 0.10 per cent.

Of the whole current follow-up series of 96 patients 77 per cent were boys. Unilateral cases were 59 per cent, of these 61 per cent on the right and 39 per cent on the left side. Twelve of the 22 girls (55 per cent) had a bilateral TEV.

5.1.1 Comments

In the material collected from the literature, which consisted of 3806 patients, 69 per cent were boys and 50 per cent unilateral. In the 1605 cases with the division dx/sin made, right-sided were 56 per cent and left-sided 44 per cent. Details of the papers are presented in Table 2, on page 10. The CHT series does not essentially deviate from the others.

5.2 Associated anomalies

One or more associated anomalies were found in 13 of the 110 idiopathic (dead or living) cases of TEV (12 per cent). These were: One tracheo-oesophageal fistula, two cases of mongolism, one mongolism with vitium cordis, one mongolism with ASD and microcephalus, one mongolism with syndactyly of the hands and feet, two cases of syndactyly, one syndactyly with amniotic stricture on the contralateral calf, one VSD, two cases of mental retardation, and one jejunal atresia with volvulus. The rate of associated anomalies in girls was 4/25 (16 per cent).

5.2.1 Comments

In the material collected from the literature, consisting of 5137 patients altogether, the proportion of associated anomalies was 13 per cent (24,26,28, 29,30,31,32,34,35,36,183). In this respect the difference between the CHT and other series was not significant.

5.3 Family history

In the CHT series 16 of the 96 follow-up patients (17 per cent) had one or more relatives with a clubfoot. The rate was 2/22 (9 per cent) in girls and 14/74 (19 per cent) in boys.

5.3.1 Comments

In the material collected from the literature, which consisted of 2801 patients, family history was observed in 287 cases (10 per cent). The difference from the higher percentage in the CHT series was almost significant. Figures are presented in Table 3, Page 11 and Table 12 below.

Table 12. Difference in the incidence of family history in the authors' and a collected series.

	Family History* Number of patients	No family history Number of patients	Total Number of patients
CHT series	16(17)	80	96
Collected series	287(10)	2514	2801
Total	303(10)	2594	2897

d.f. 1, Chi-square 4.085 Interpretation: $p<0.05$

*Percentages are given in brackets

5.4 Gestation

Some kind of complication during pregnancy was observed in 14 of the 110 mothers of babies with an idiopathic TEV (13 per cent).

Bleeding was observed in 12 of 110 cases (ten cases of abortus imminens around the 8th week, one abortus imminens in the 19th week, and one partus praematurus imminens in the 28th week). The general incidence of bleeding during pregnancy in the CHT was only 1549/29736 (5 per cent) in the years 1972—78. The difference in frequencies was significant as shown in Table 13.

Table 13. Difference in incidence of bleeding in clubfoot and 'normal' pregnancies.

	Bleeding* Number of mothers	**No bleeding Number of mothers**	**Total number of mothers**
In TEV (CHT)	**12(11)**	**98**	**110**
Generally (CHT)	**1549 (5)**	**28187**	**29736**
Total	**1561 (5)**	**28285**	**29847**

d.f. 1, Chi-square 7.001 ***Interpretation:*** $p<0.01$

***Percentages are given in brackets**

Toxaemia gravidarum was observed in two of 110 cases. The general incidence of pre-eclampsia gravidarum in the CHT was 0.7 per cent (216/29736) in the years 1972—78. The difference did not reach statistical significance.

In 4 of the 110 cases with an idiopathic TEV there was a twin pregnancy. In all of them only one of the twins had a clubfoot deformity. The frequency of twins and other multiple pregnancies was 1.3 per cent (882/67054) in the CHT in the years 1963—78. The difference in percentages was not statistically significant.

Neither the age of mothers nor the parity correlated to the grade of the TEV.

5.4.1 Comments

The general frequency of bleeding in the early months of pregnancy was estimated at 20 per cent by Pelosi and Iffy (229), half of the cases resulting in abortion. Wynne-Davies, Littlejohn and Gormley (41) found antenatal bleeding in 7 of their 33 cases of TEV (21.2 per cent). With normal infants the corresponding figure was 8.7 per cent. The latter authors also noted high maternal blood pressure in 8 of the 33 cases of TEV (24.2 per cent), the corresponding figure in the controls being 10 per cent.

In the author's series, bleeding during pregnancy was observed more often in the anamnesis of TEV children than in the CHT generally. The incidence of bleeding and toxaemia gravidarum was lower in the CHT both in the TEV pregnancies and generally, than the figures given by others (41,229). This might indicate the high standard of Finnish maternity care but the low incidence of bleeding and toxaemia was not combined with a decrease in the incidence of TEV as observed by others (41).

On the basis of the small material no conclusion could be drawn concerning the possible influence of a multiple pregnancy on the risk of TEV.

5.5 Grade distribution and treatment

Table 14. Primary grade of TEV/operative and conservative therapy.

Boys			Girls			Boys and girls
Severity	Operated	Conservatively treated	Severity	Operated	Conservatively treated	Total number of feet
	Number of feet*			Number of feet*		
Grade 4:24	23	1	Grade 4: 9	8	1	33
Grade 3:68	49	19	Grade 3:22	19	3	90
Grade 2: 9	1	8	Grade 2: 3	—	3	12
Total: 101	73(72)	28	Total: 34	27(79)	7	135

*Percentages are given in brackets

Achilles tenotomy was regarded as sufficient (there was no need for further operations) in 10 of the 19 cases treated with it, posteromedial release in 63 of the 76 cases (83 per cent), osteotomy in one of the two cases, and medial release, posterior release and myotomy in the only cases performed. Of the remaining 23 reoperated feet (15 in boys and 8 in girls) fourteen involved grade 3 and nine grade 4 feet.

5.5.1 Comments

In a combined material of 740 clubfeet altogether, the share of postural clubfeet was estimated to be 90 (12 per cent) (19,29,205).

5.6 Complications in therapy and cases of death

Of the 96 patients 14 (10 boys and 4 girls) had complications associated with therapy. One of them had necrosis in the wound margin and later on a decubitus, another one a wound infection in both feet and a third a decubitus in both of his feet. The number of complications was 17 in 135 feet (13 per cent). They were of mild character except the two cases of wound infection, which lasted 1.5 months, and a bimalleolar fracture which needed special attention. Five of the children with complications were operated on later.

Of postoperative complications four (a wound infection, two cases of necrosis in the wound margin, and one decubitus) occurred in patients who were operated on at ages less than a week, three (infected wound dehiscations) in those who were operated on in their second week, and one (a stitch channel infection) in a boy three weeks old at time of operation. The last three complications appeared after an operation at the age of three months (wound dehiscence without infection), 6 months (wound infection), and 12 years (infected wound dehiscation).

Two of the boys operated on in their second week of life and a girl who underwent an operation at the age of one month who all had a postoperative complication, were reoperated at the ages of 1, 7 and 12 years, respectively.

No anaesthetic or other intraoperative complications were observed.

The complications in conservative therapy occurred at the age of three weeks (a case of decubitus and another case of decubitus in both feet. The latter was operated at the age of 1.5 years.), one month (a bimalleolar fracture. The patient was operated for her foot three times after the age of four years), and two months (two cases of decubitus).

The frequency of complications in operative and conservative treatment was thus 11/100 and 6/35 (17 per cent), respectively. The difference was not statistically significant. Thirteen of the complications occurred in grade 3 and four in grade 4 feet.

One boy (bilateral TEV, necrotic volvulus and ileojejunal atresia) died at the age of four days after a laparotomy and before any treatment for his feet. Another boy (bilateral TEV and mongolism) succumbed at the age of eight months to pneumonia. A third infant, a girl (bilateral TEV, mongolism, microcephaly and vitium cordis), died at the age of six months of pneumonia and cardiac symptoms. In the last two cases the clubfoot had been treated conservatively.

5.6.1 Comments

The fact that the operative complications, although of mild character, were frequent in cases operated at younger age, seems to emphasize the importance

of meticulous postoperative follow-up in cases treated with primary operation.

The difference in the incidence of complications was not statistically significant with regard to either the sex of the patients or the primary grade of TEV. The operative therapy for clubfoot had no connection with the death of the three infants.

5.7 Dependence of information, variables, and scores on patients' age at follow-up

There was no correlation between the age at follow-up and the sex distribution of the patients. There was a tendency to the milder primary grades in the age group 8—14 years as presented in table 15.

Table 15. Dependence of the primary grade of the TEV on patients' age at follow-up.

Grade	Age 1 — Number of feet	Age 8 — Number of feet	Age 15 — Number of feet	Age 22 — Number of feet	Total number of feet
2	2	7	3	0	12
3	28	23	25	14	90
4	15	4	13	1	33
Total	**45**	**34**	**41**	**15**	**135**

d.f. 6, Chi-square 14.44 *Interpretation: $p<0.05$*

There was a natural dependence of growth on age at follow-up in all of the metric and planimetric quantities, as will be seen in Figures 14—33, pages 52—61.

Concerning the variables which represent shape and function, the situation was slightly different as shown in Figures 34—43, pages 62—66. In clubfeet, the healthy feet of patients and the control feet, no dependence on age at follow-up was observed in standing on the toes, skin quality, daily life, fatigue, the dorsi- and plantarflexion of the ankle, or the talar class. The dependence on age at follow-up of the other variables is presented in Table 16, page 49.

Table 16. Dependence of some variables on the growing age at follow-up.

Parameter	Clubfeet	Patients healthy feet	Control feet
Vault of the foot	Decrease ($p<0.05$)	No correlation	Increase ($p<0.001$)
Squatting	Decrease ($p<0.001$)	No correlation	Increase ($p<0.05$)
Sidewards flexibility of the ankle	Decrease ($p<0.05$)	No correlation	No correlation
Pain	Increase ($p<0.001$)	No correlation	Decrease ($p<0.05$)
Shoes	Improvement ($p<0.001$)	No correlation	No correlation
The T/C index	Decrease ($p<0.001$)	No correlation	—
The T/MI angle	Increase ($p<0.005$)	No correlation	—
The T/MV angle	Increase ($p<0.001$)	No correlation	—
The T/Nav angle	Increase ($p<0.001$)	No correlation	—
The fibular retroposition	No correlation	Increase at the age 8—14 yrs ($p<0.050$)	—
The epiphysis of the tibia	Decrease in changes ($p<0.05$)	No correlation	—

Psychosocial aspects, reflecting the patients own and the other peoples' attitude to his treated TEV, were not dependent on the patient's age at follow-up.

The timing of operative treatment and the type of therapy were obviously dependent on the patient's age at follow-up as presented in Tables 17 A and B.

Table 17 A Timing of operative therapy in different follow-up age groups.

Age at operation	Age 2 — Number of feet	Age 8 — Number of feet	Age 14 — Number of feet	Age 20 — Number of feet	Total number of feet
<1 week	30	4	1	0	35
1 week- 1 year	14	4	4	8	30
>1 years	1	4	19	11	35
Total	45	12	24	19	100

d.f. 6, Chi-square 52.86 *Interpretation: Obvious dependence*

Table 17 B The type of therapy in different follow-up age groups in grade 3 and 4 feet.

Type of therapy	Age 2 — Number of feet	Age 8 — Number of feet	Age 14 — Number of feet	Age 20 — Number of feet	Total number of feet
Primary operation	39	2	1	2	44
Conservative	0	9	14	1	24
Conservative + delayed op.	4	11	23	17	55
Total	43	22	38	20	123

d.f. 6, Chi-square 89.71 *Interpretation: Obvious dependence*

The dependence of scores in size and shape on the age of the patients was also significant, the scores being poorer in the older age groups as shown in Tables 18 and 19.

Table 18. Dependence of score in size on age at follow-up.

Age (years)	Score in size 71 — Number of feet	Score in size 81 — Number of feet	Score in size 91 — Number of feet	Score in size 101 — Number of feet	Total number of feet
3 — 7	1	17	21	4	43
8 — 13	4	8	7	3	22
14 — 19	15	11	10	2	38
20 — 29	9	3	4	4	20
Total	29	39	42	13	123

d.f 9, Chi-square 23.49 Interpretation: $p<0.01$

Table 19. Dependence of score in shape on age at follow-up.

Age (years)	Result, shape 61 — Number of feet	Result, shape 71 — Number of feet	Result, shape 81 — Number of feet	Total number of feet
3 — 7	4	12	27	43
8 — 13	6	12	4	22
14 — 19	9	17	12	38
20 — 29	10	6	4	20
Total	29	47	47	123

d.f. 6, Chi-square 23.04 *Interpretation: $p<0.001$*

In the following Figures 14—53 the curves are 50 percentile curves, smoothed by hand. Deviation from 20 per cent to 80 per cent is expressed by shadowing or by vertical lines.

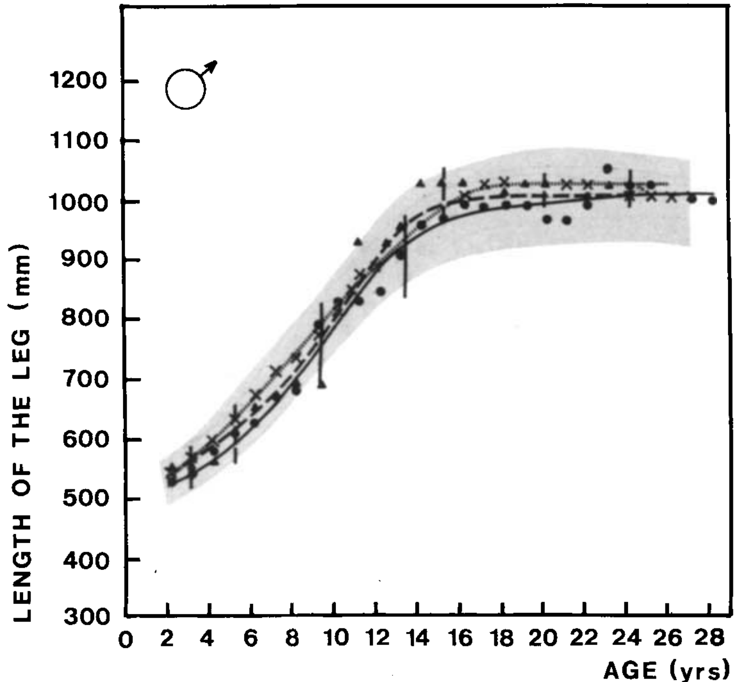
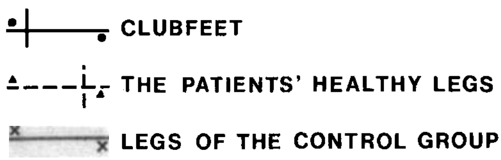


Figure 14. Dependence on age at follow-up of the length of the leg in boys:



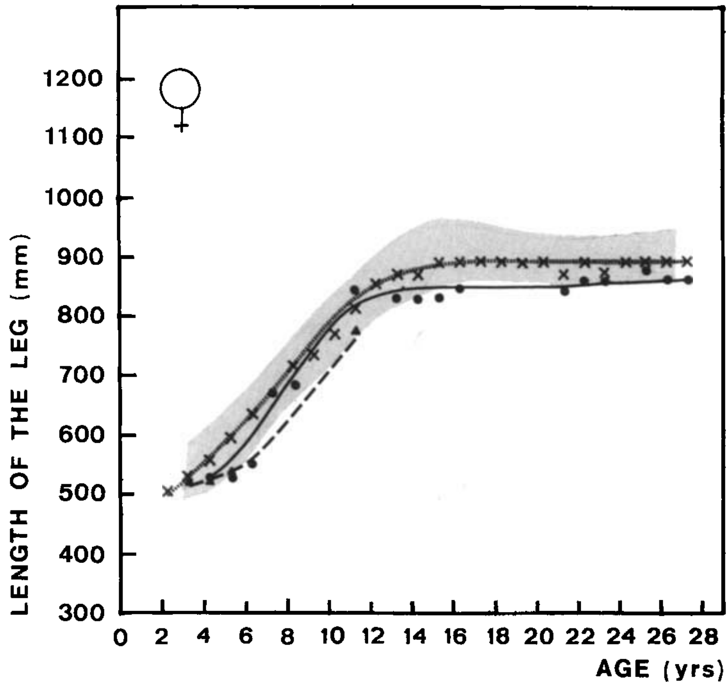
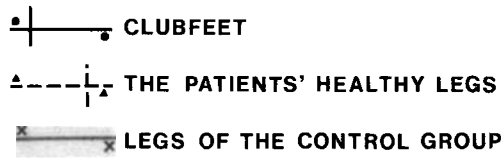


Figure 15. Dependence on age at follow-up of the length of the leg in girls:



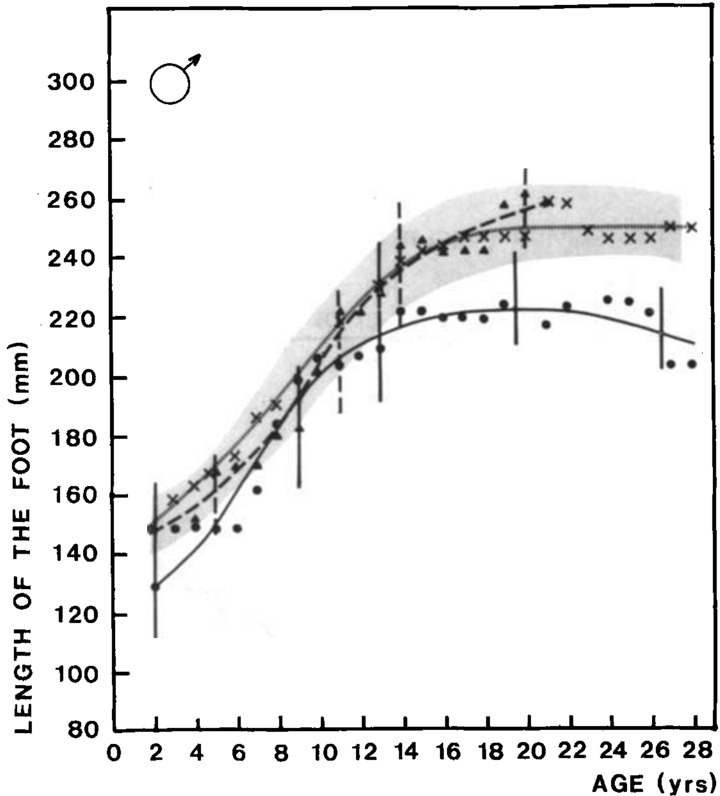
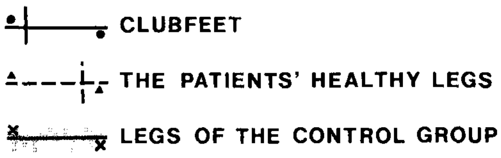


Figure 16. Dependence on age at follow-up of the length of the foot in boys:



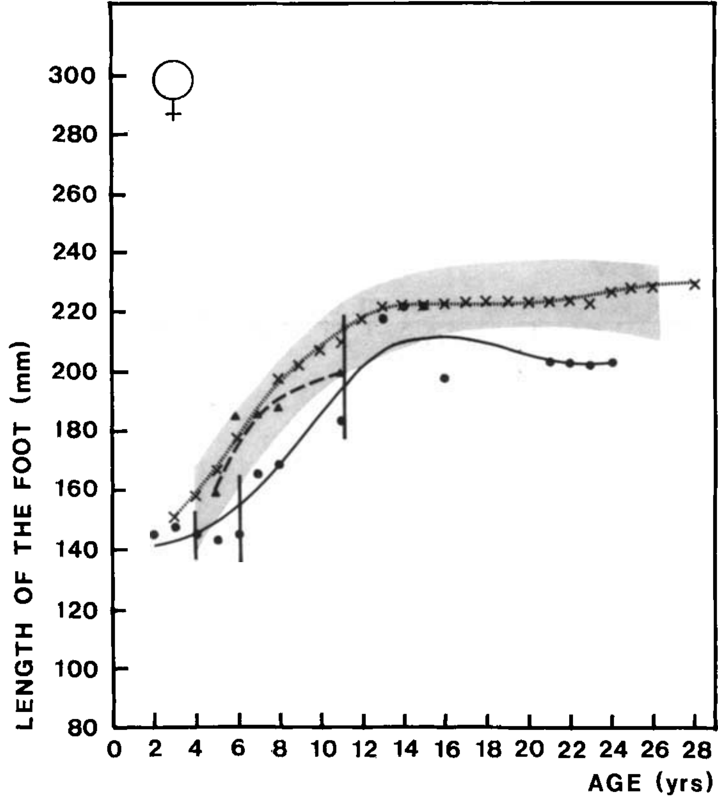
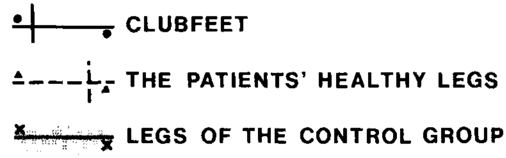


Figure 17. Dependence on age at follow-up of the length of the foot in girls:



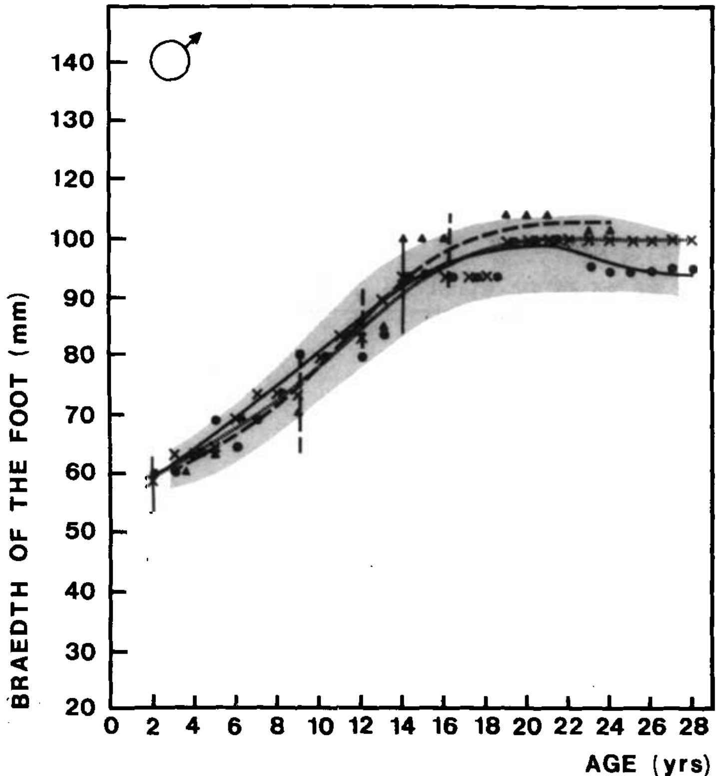


Figure 18. Dependence on age at follow-up of the breadth of the foot in boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

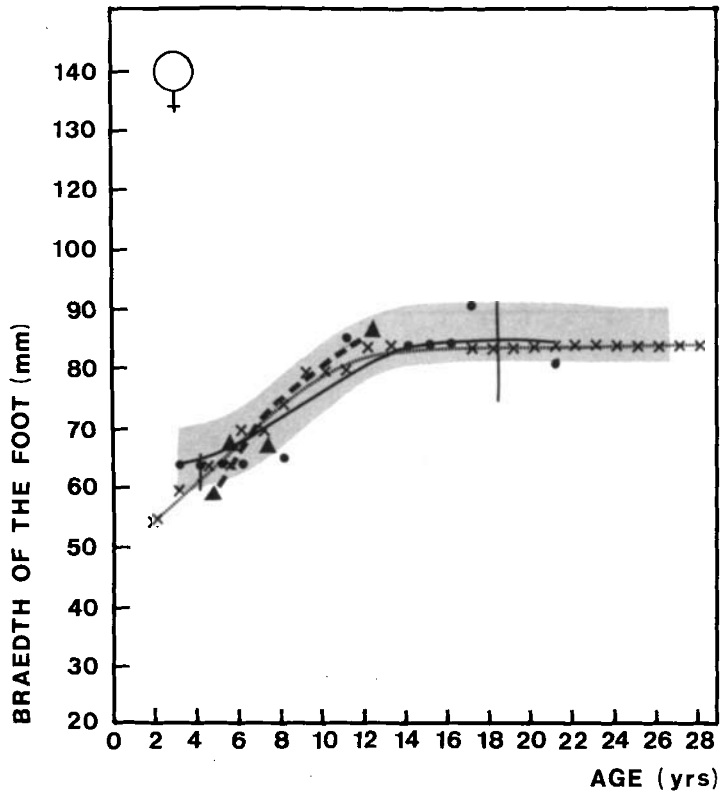


Figure 19. Dependence on age at follow-up of the breadth of the foot in girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

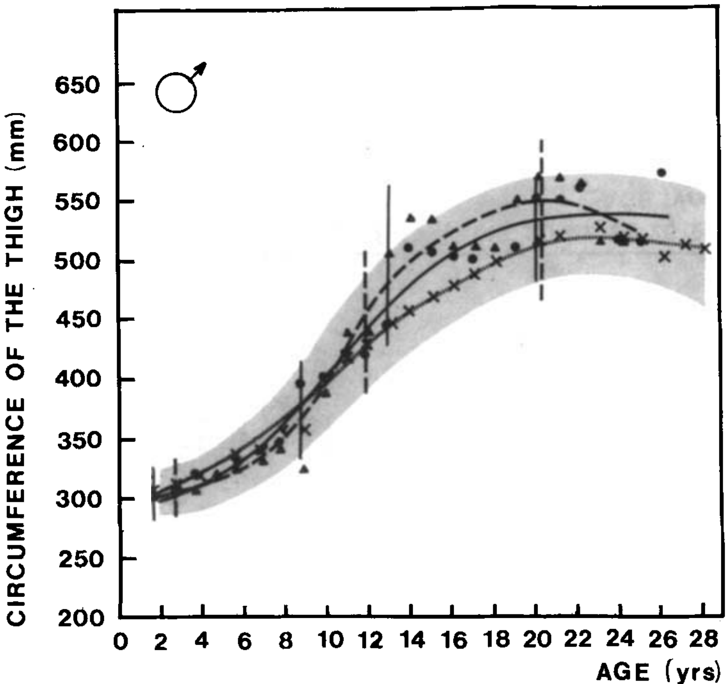
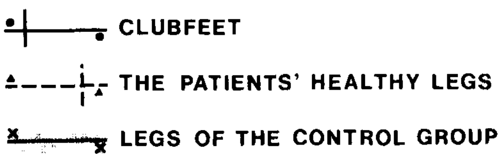


Figure 20. Dependence on age at follow-up of the circumference of the thigh in boys:



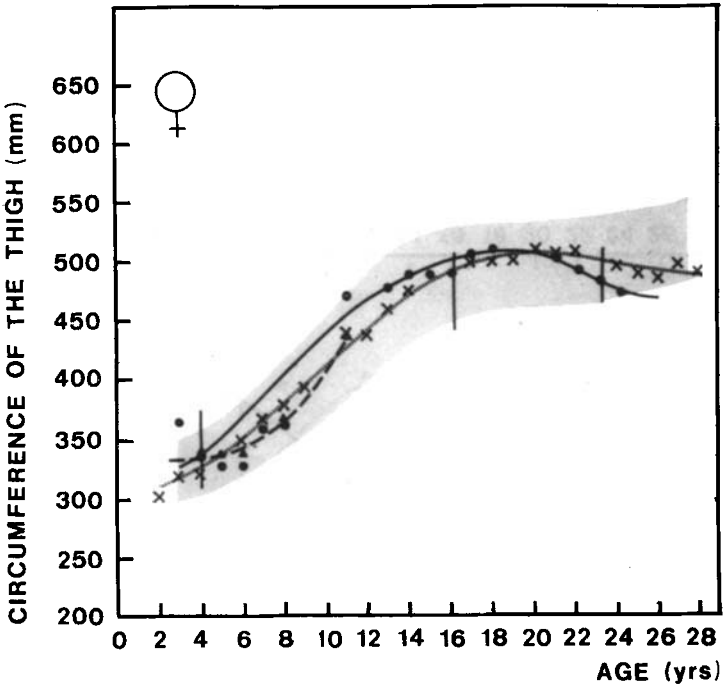
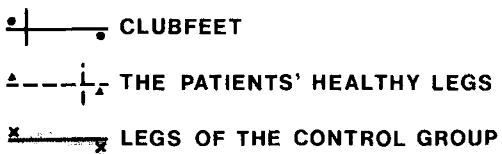


Figure 21. Dependence on age at follow-up of the circumference of the thigh in girls:



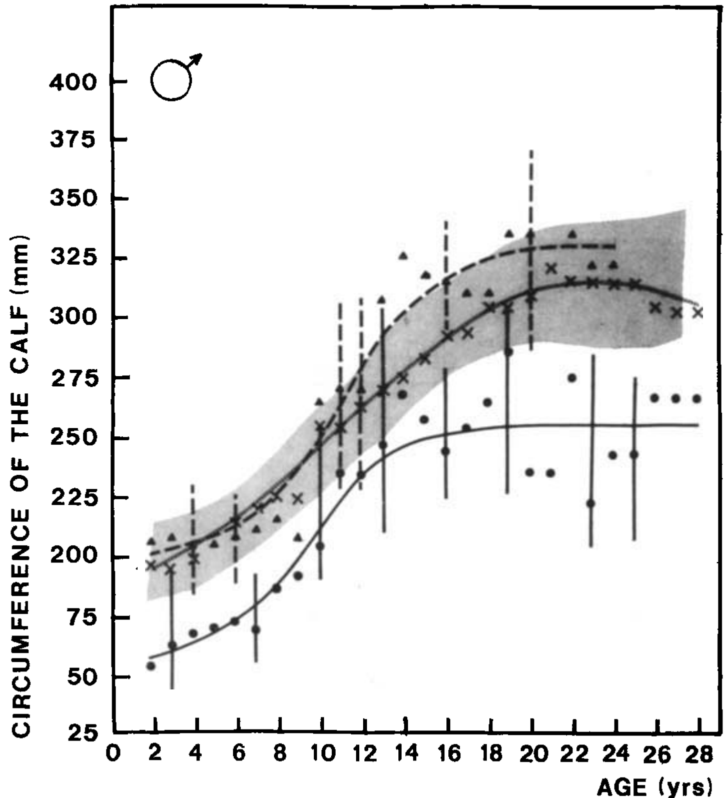


Figure 22. Dependence on age at follow-up of the circumference of the calf in boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

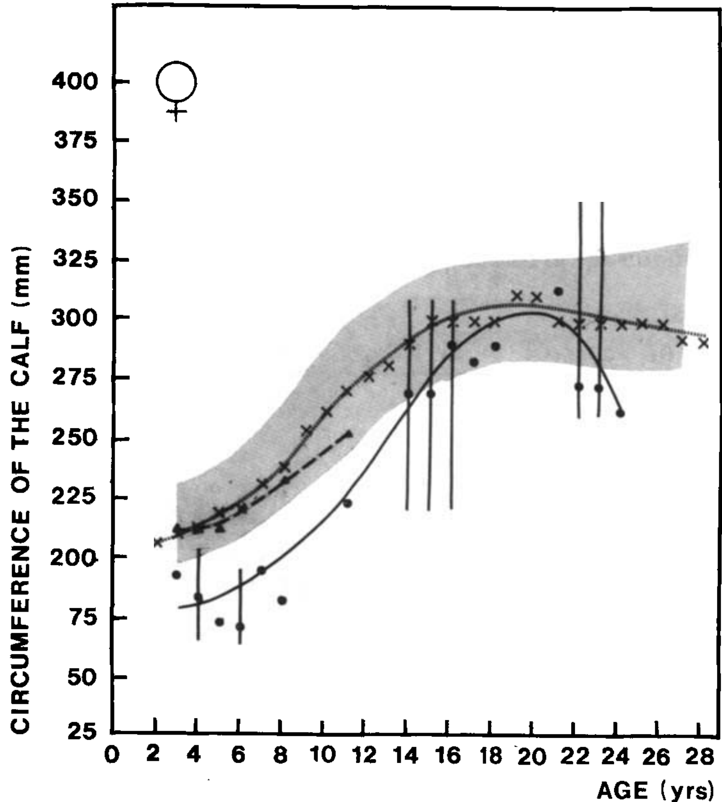


Figure 23. Dependence on age at follow-up of the circumference of the calf in girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

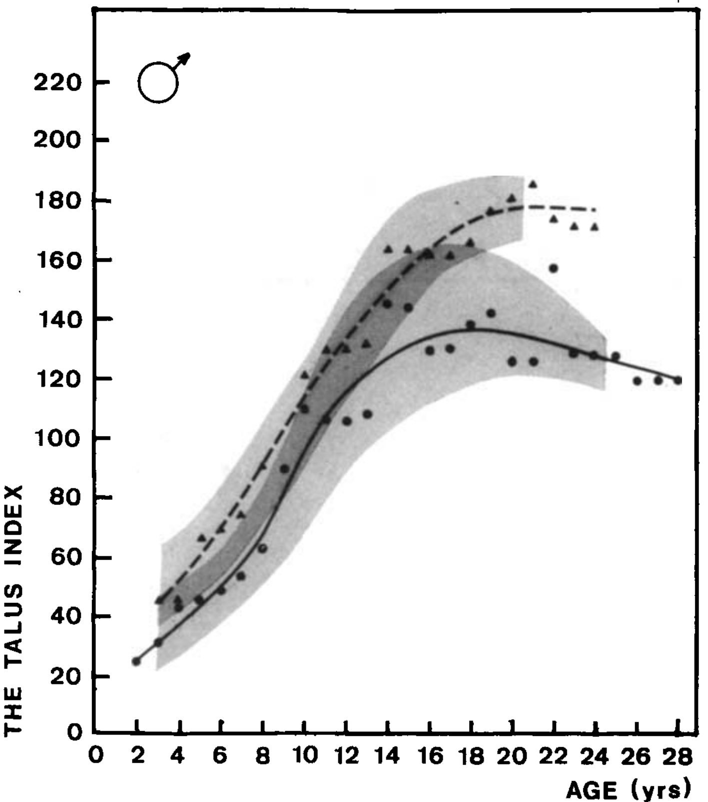


Figure 24. Dependence on age at follow-up of the talus (lateral planimetry, see page 143) in boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

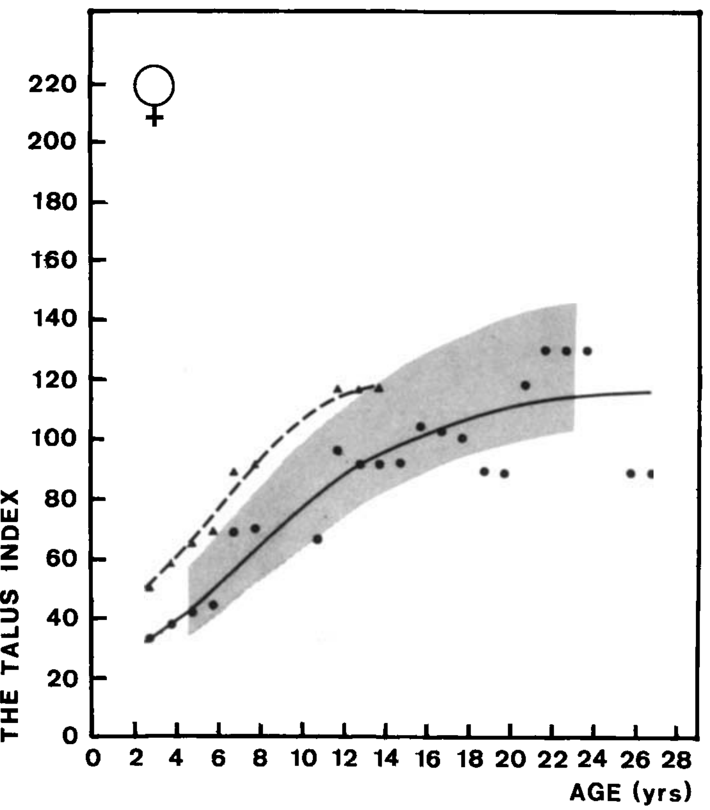


Figure 25. Dependence on age at follow-up of the talus in girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

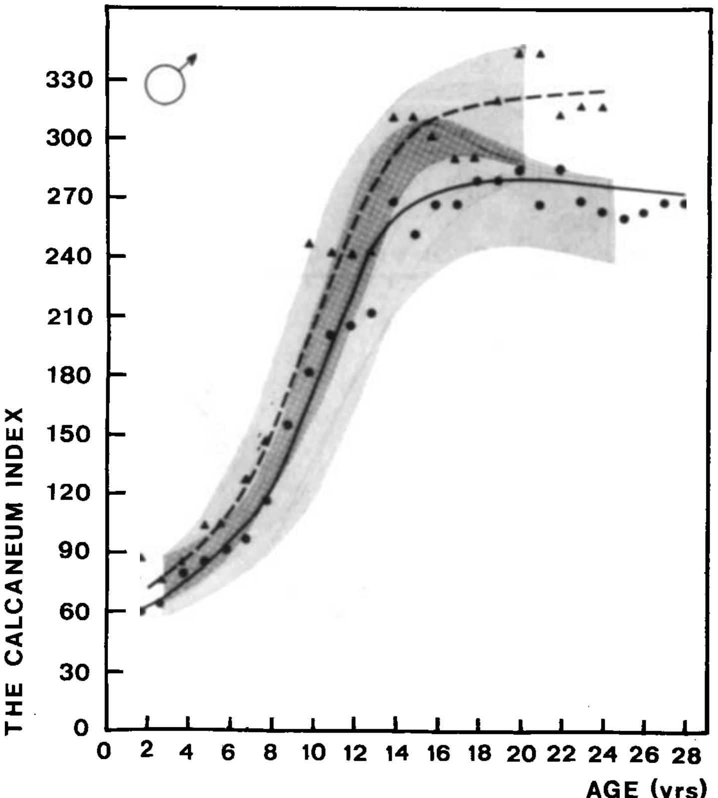


Figure 26. Dependence on age at follow-up of the calcaneum (lateral planimetry, see page 143) in boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

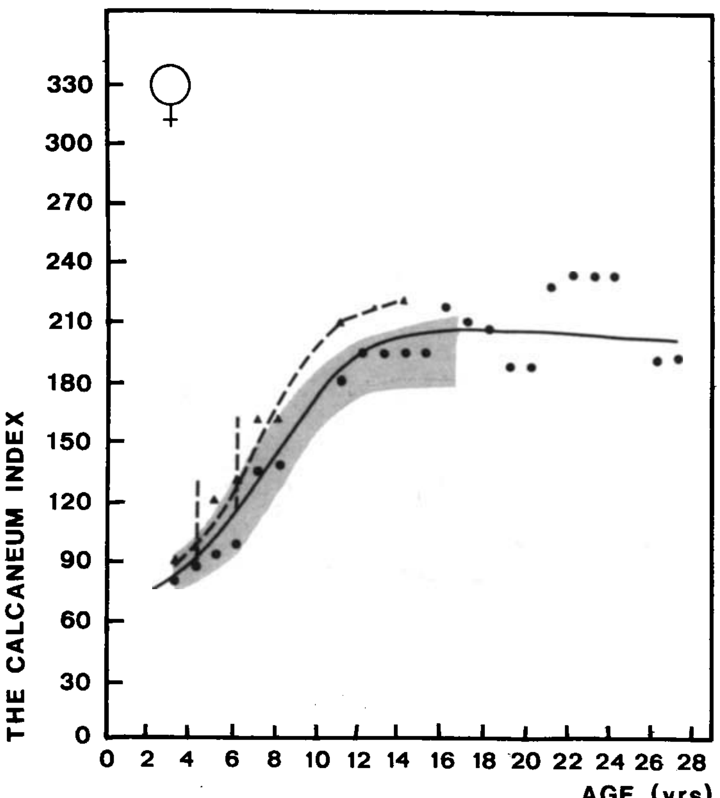


Figure 27. Dependence on age at follow-up of the calcaneum in girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

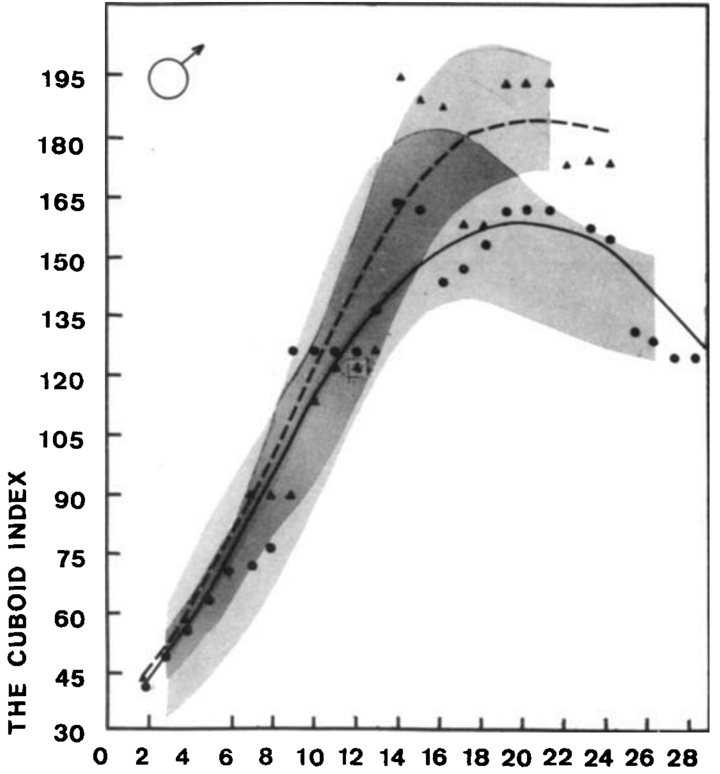


Figure 28. Dependence on age at follow-up of the cuboid (sum of lateral and a-p planimetries, see page 143) in boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

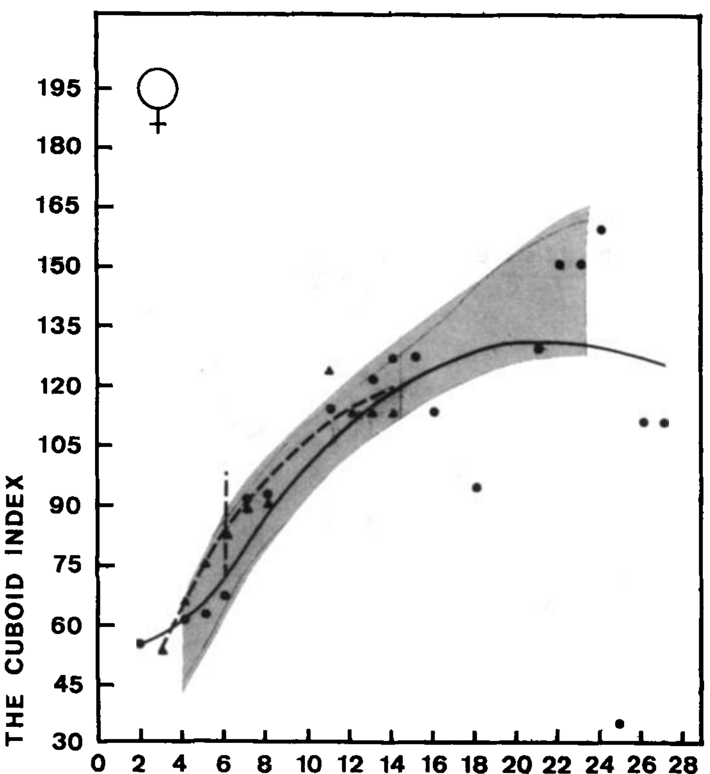


Figure 29. Dependence on age at follow-up of the cuboid in girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

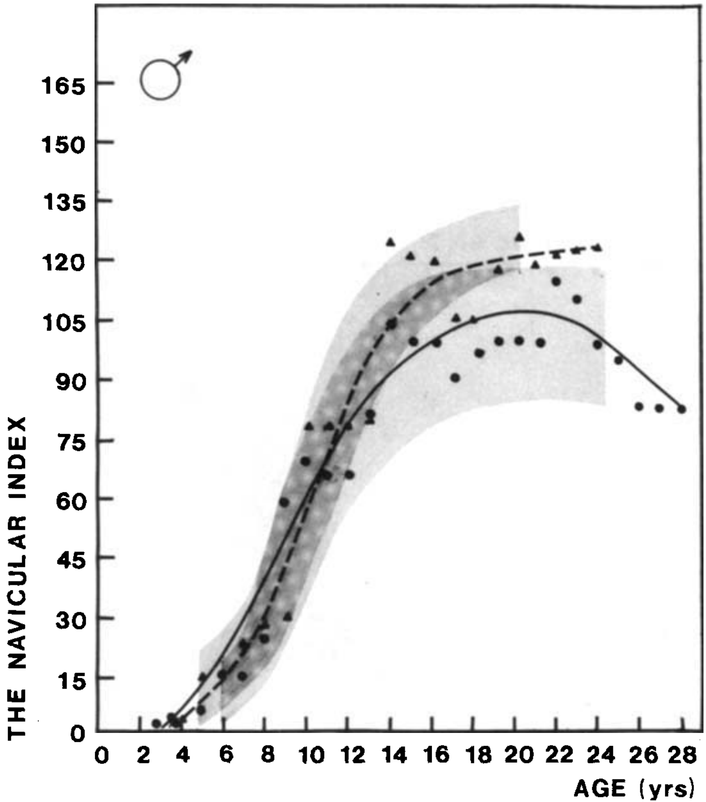


Figure 30. Dependence on age at follow-up of the navicular (sum of lateral and a-p planimetries, see page 143) in boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

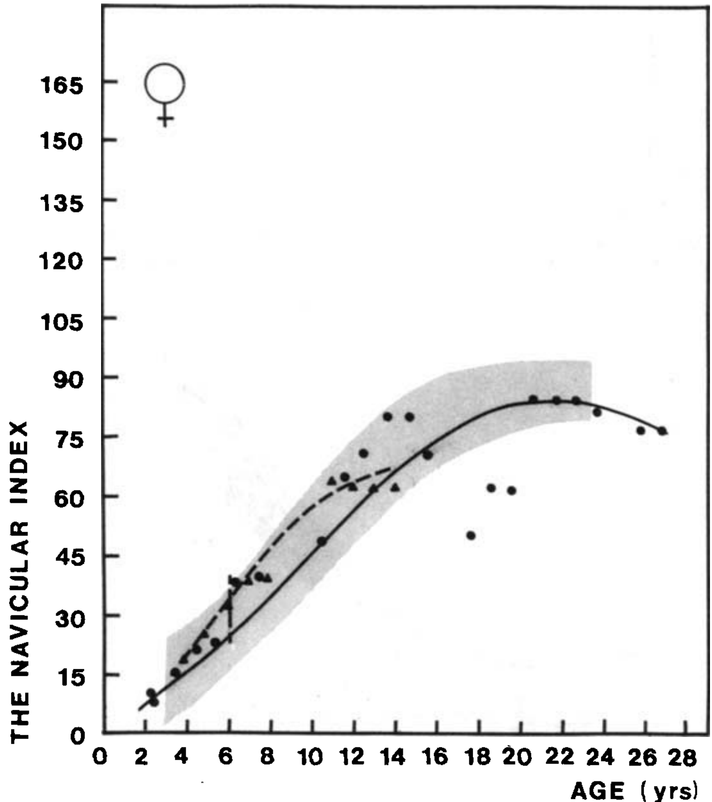


Figure 31. Dependence on age at follow-up of the navicular in girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

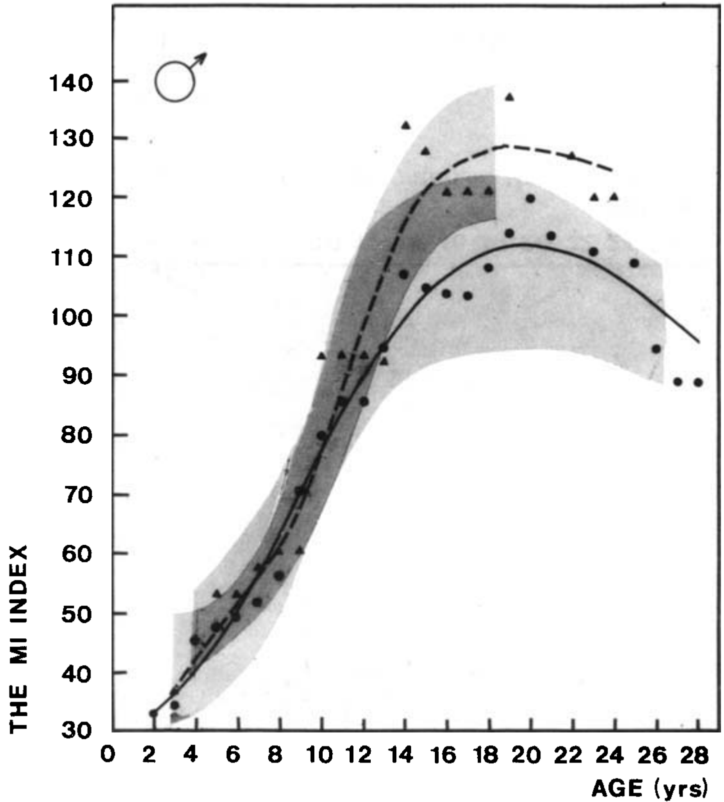


Figure 32. Dependence on age at follow-up of the MI (a-p planimetry, see page 107) in boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

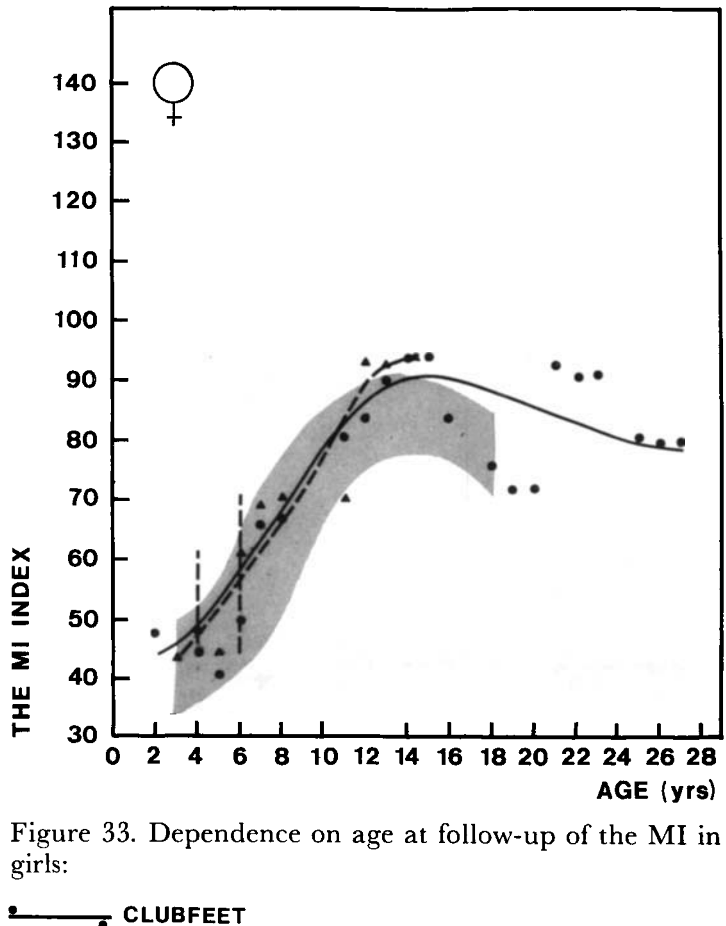


Figure 33. Dependence on age at follow-up of the MI in girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

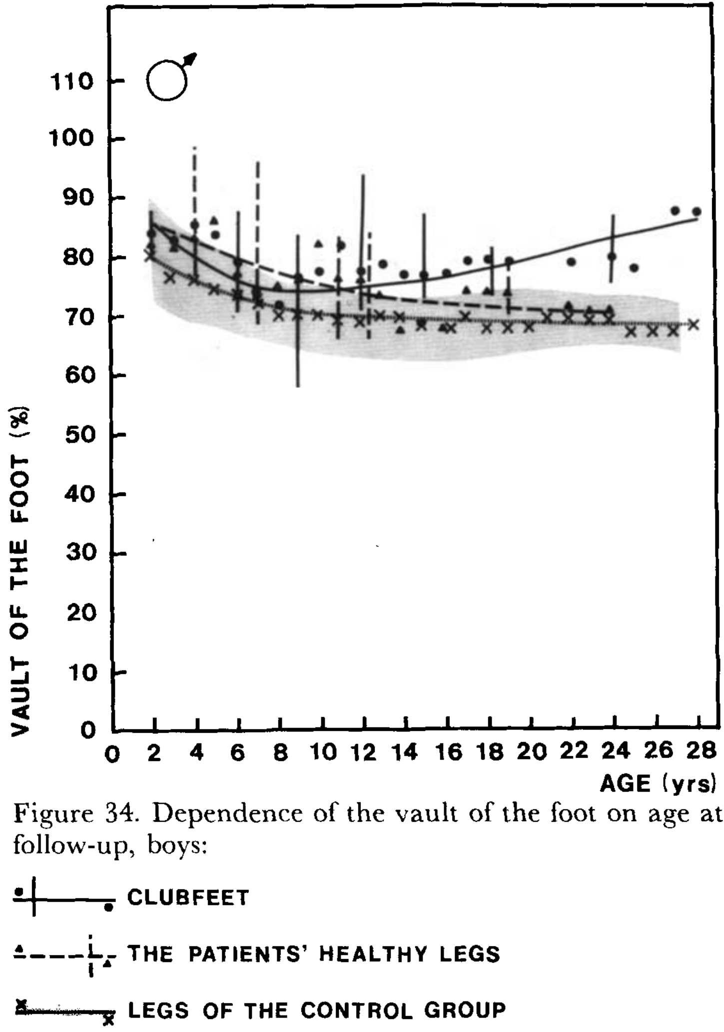


Figure 34. Dependence of the vault of the foot on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

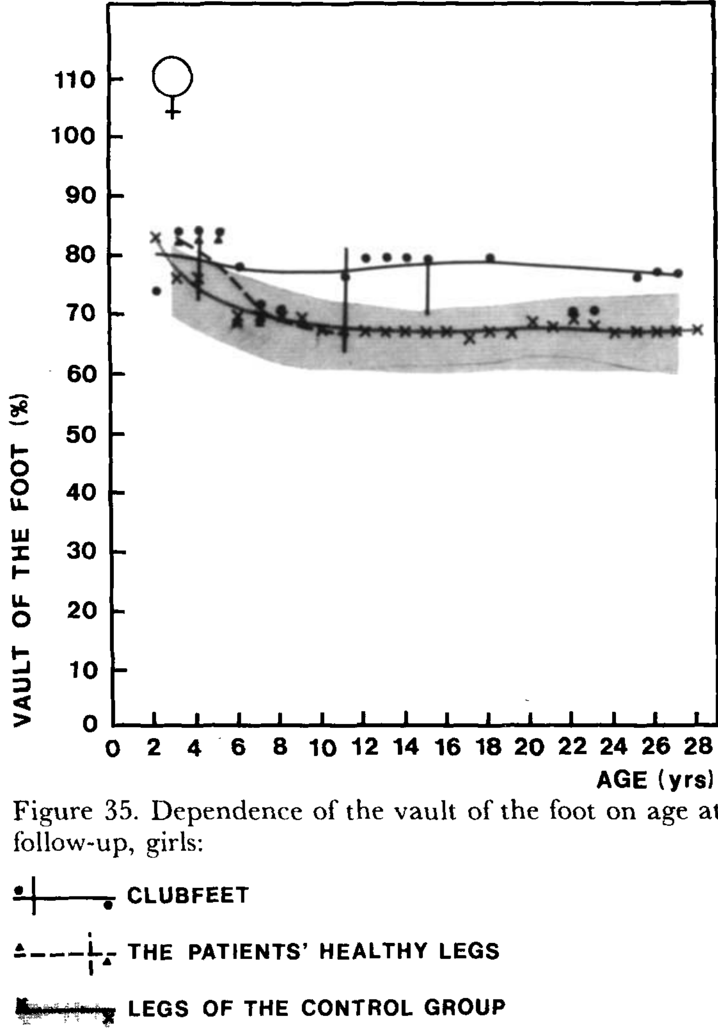


Figure 35. Dependence of the vault of the foot on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

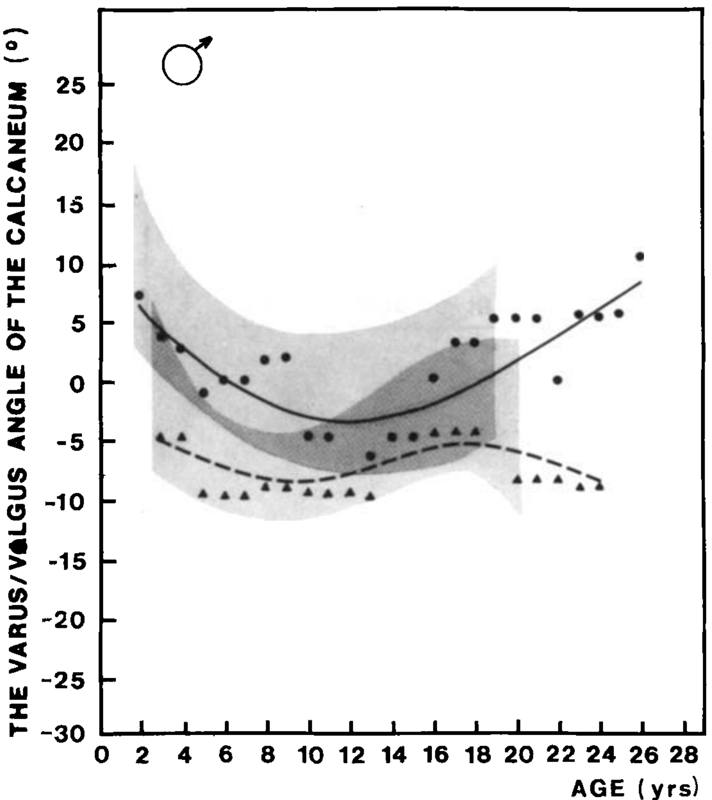


Figure 36. Dependence of the varus/valgus angle of the calcaneum on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

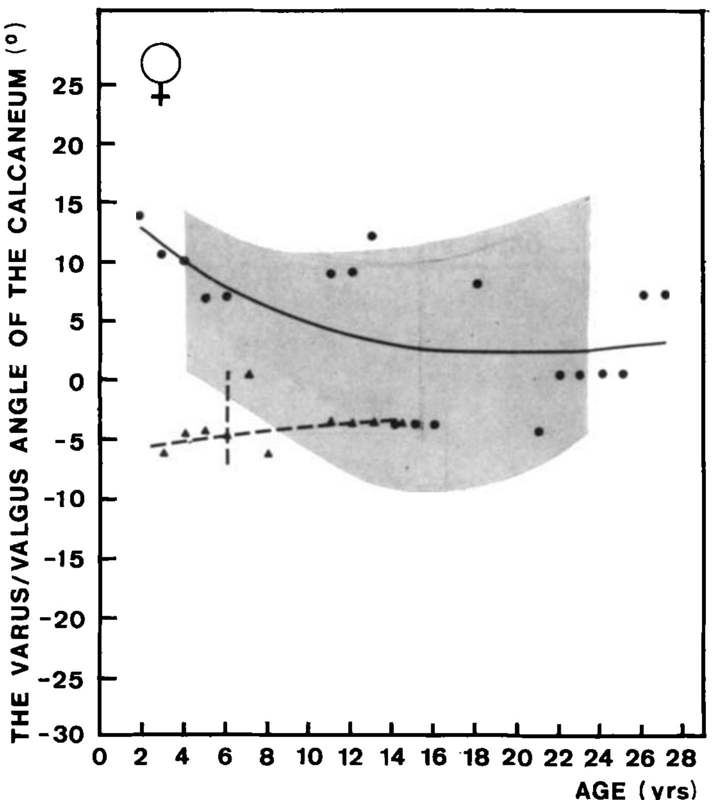


Figure 37. Dependence of the varus/valgus angle of the calcaneum on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

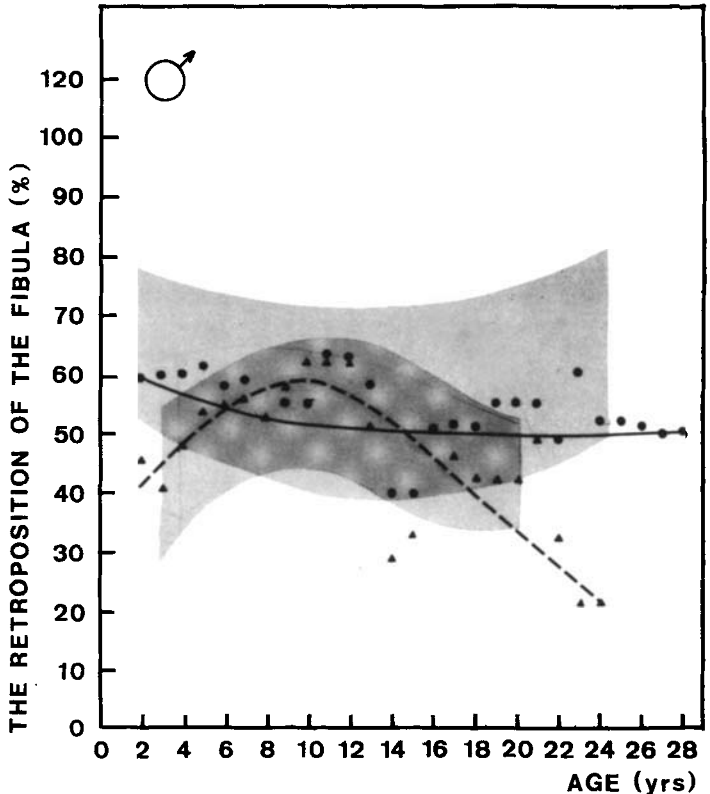


Figure 38. Dependence of the fibular retroposition on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

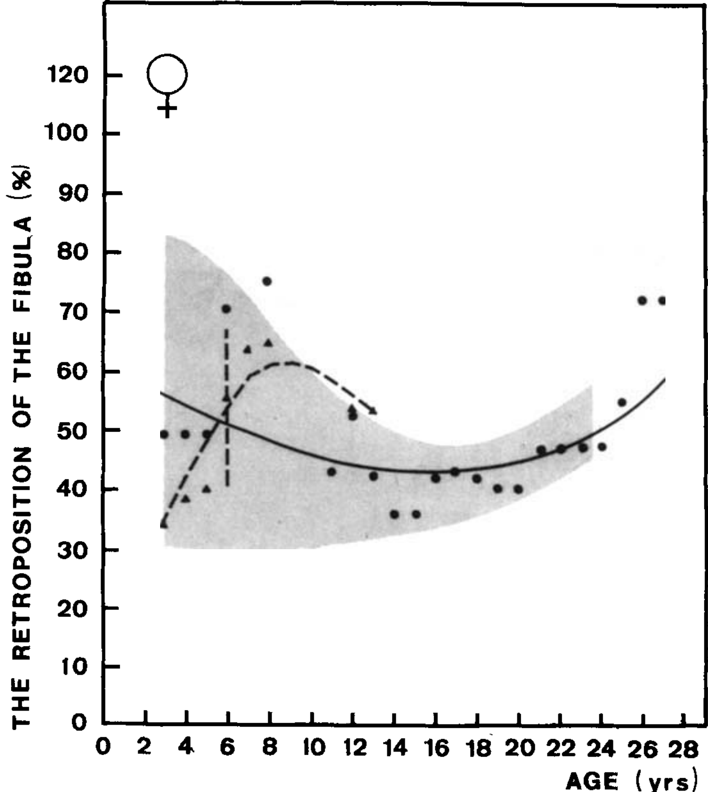


Figure 39. Dependence of the fibular retroposition on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

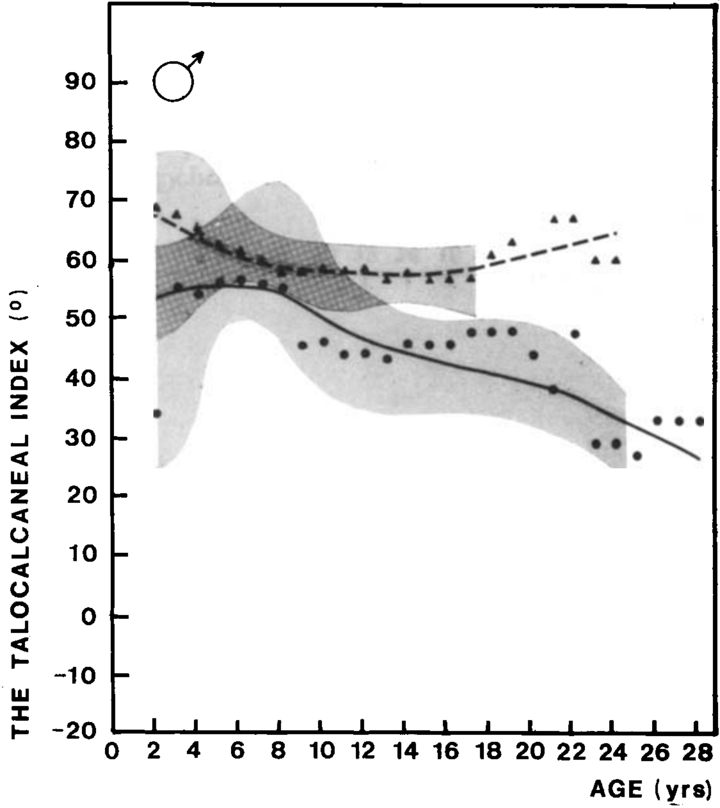


Figure 40. Dependence of the talocalcaneal index on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

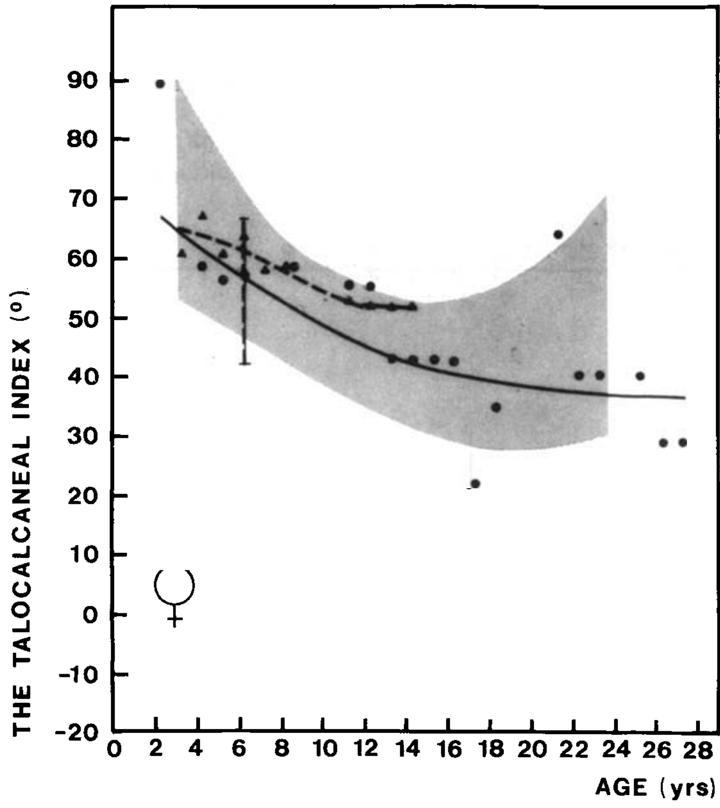


Figure 41. Dependence of the talocalcaneal index on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

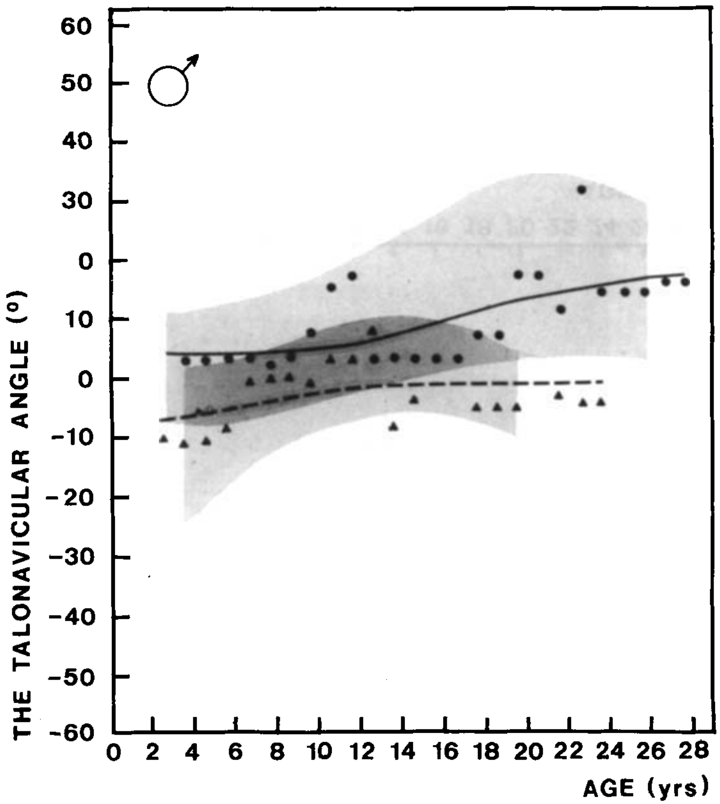


Figure 42. Dependence of the talonavicular angle on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

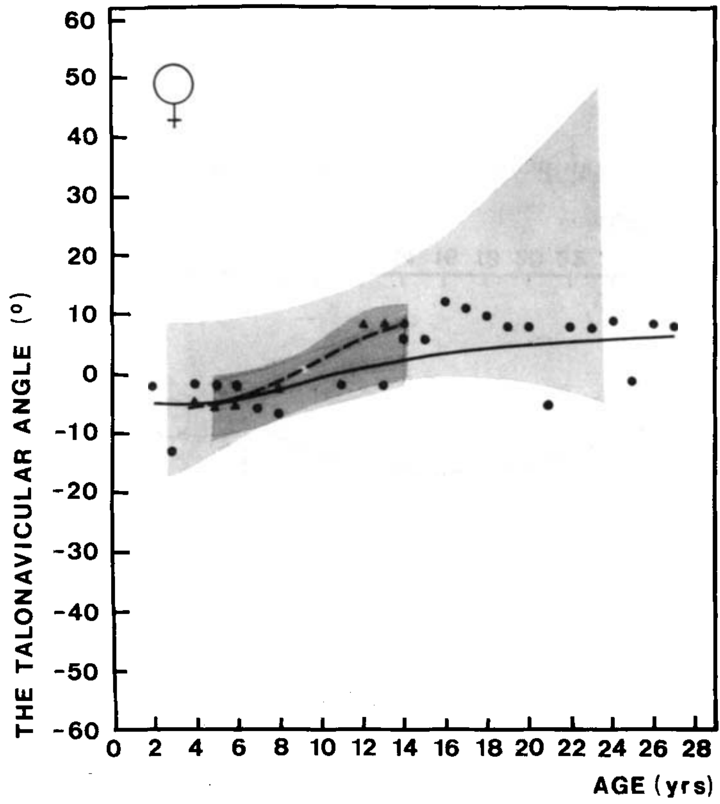


Figure 43. Dependence of the talonavicular angle on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

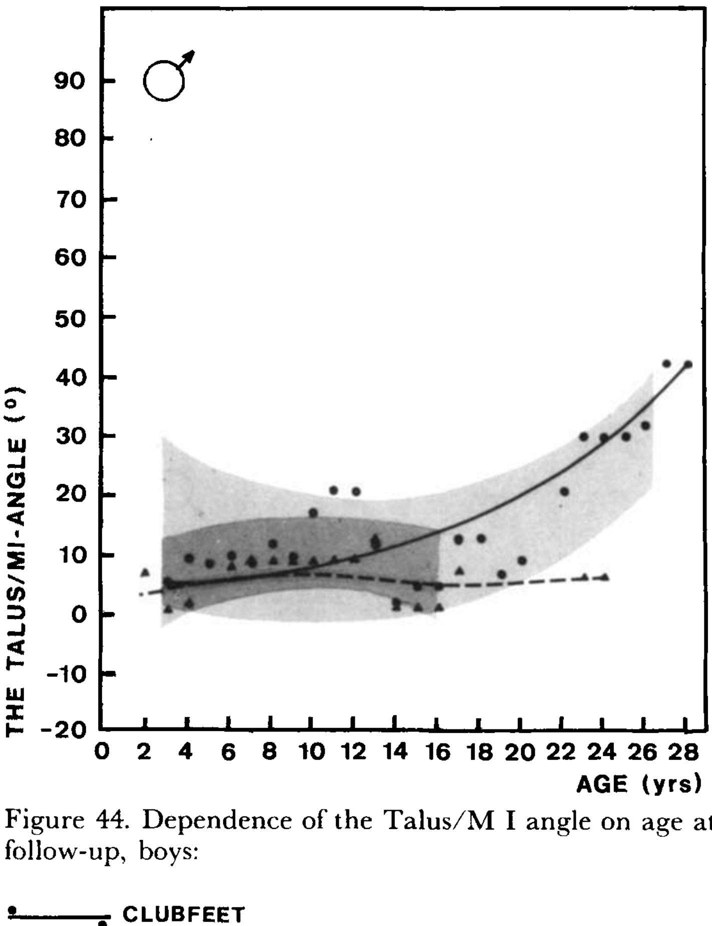


Figure 44. Dependence of the Talus/M I angle on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

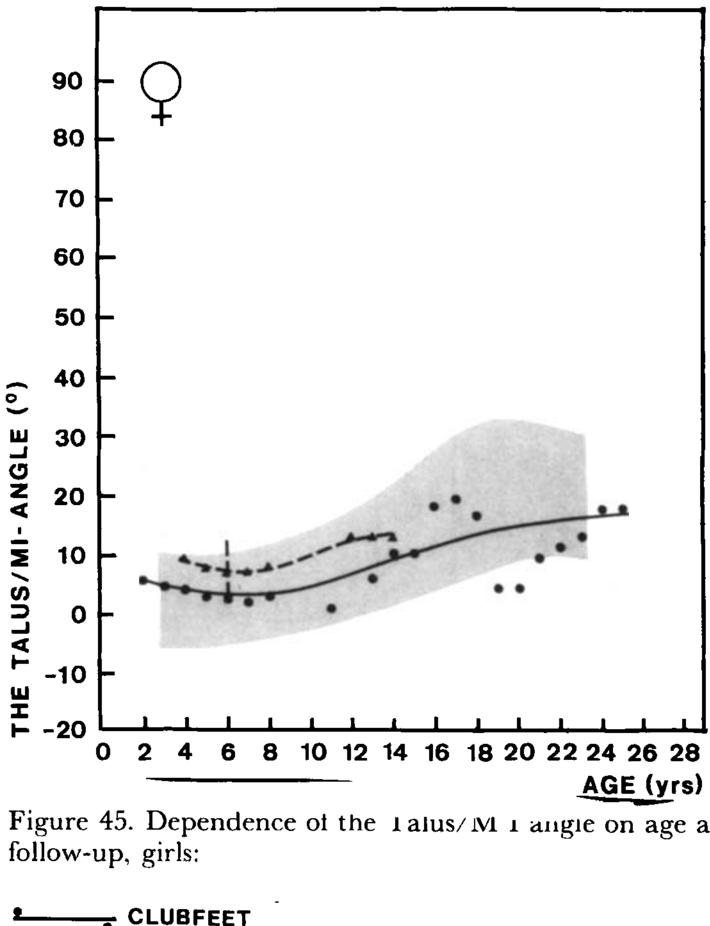


Figure 45. Dependence of the Talus/M I angle on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

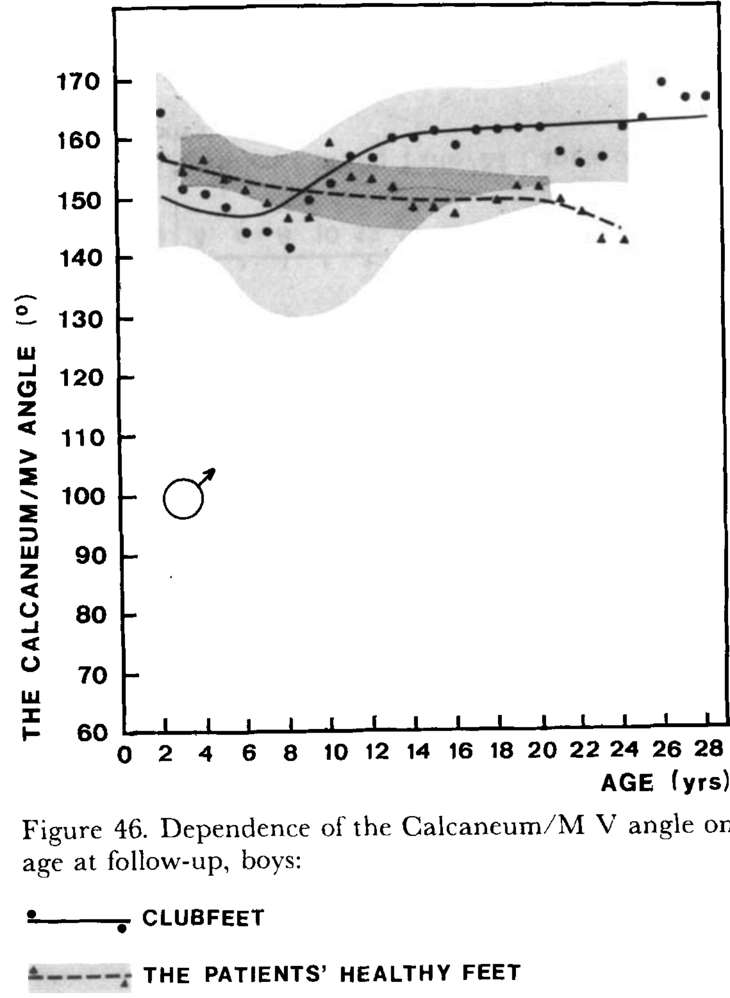


Figure 46. Dependence of the Calcaneum/M V angle on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY FEET

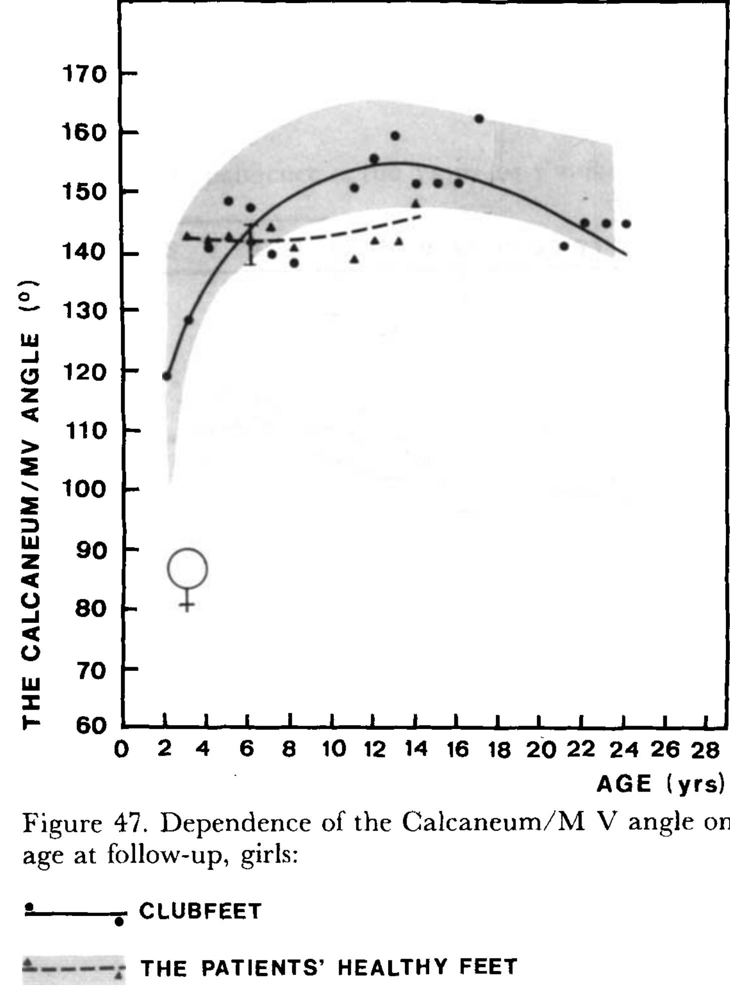


Figure 47. Dependence of the Calcaneum/M V angle on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY FEET

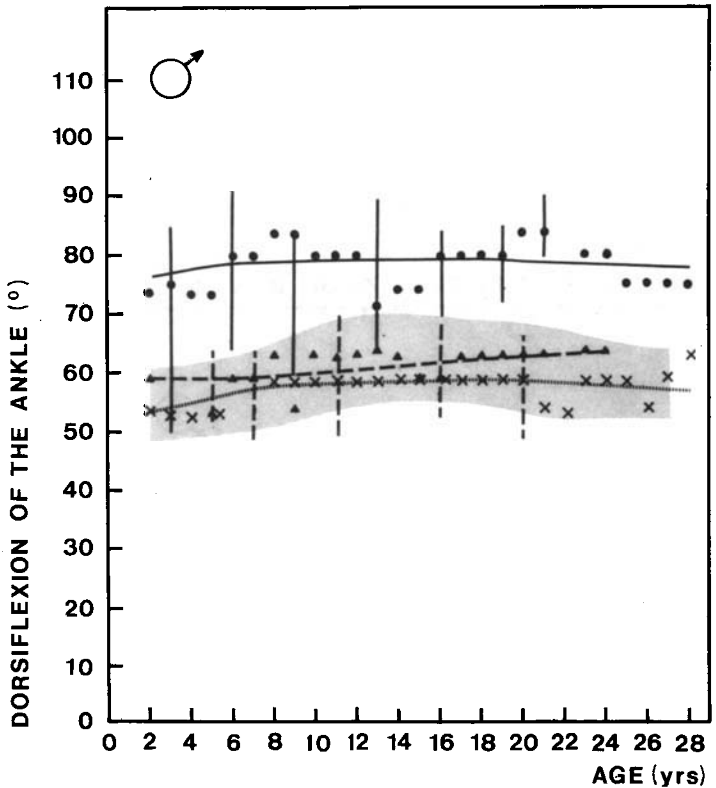
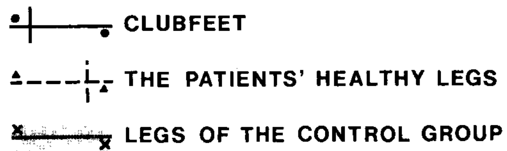


Figure 48. Dependence of the dorsiflexion of ankle on age at follow-up, boys:



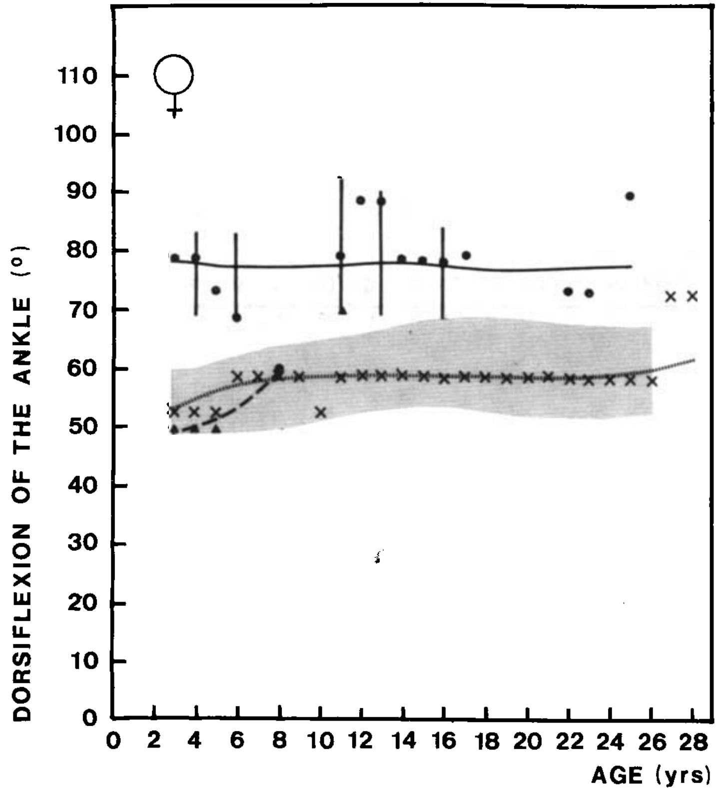
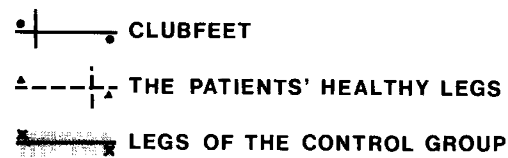


Figure 49. Dependence of the dorsiflexion of the ankle on age at follow-up, girls:



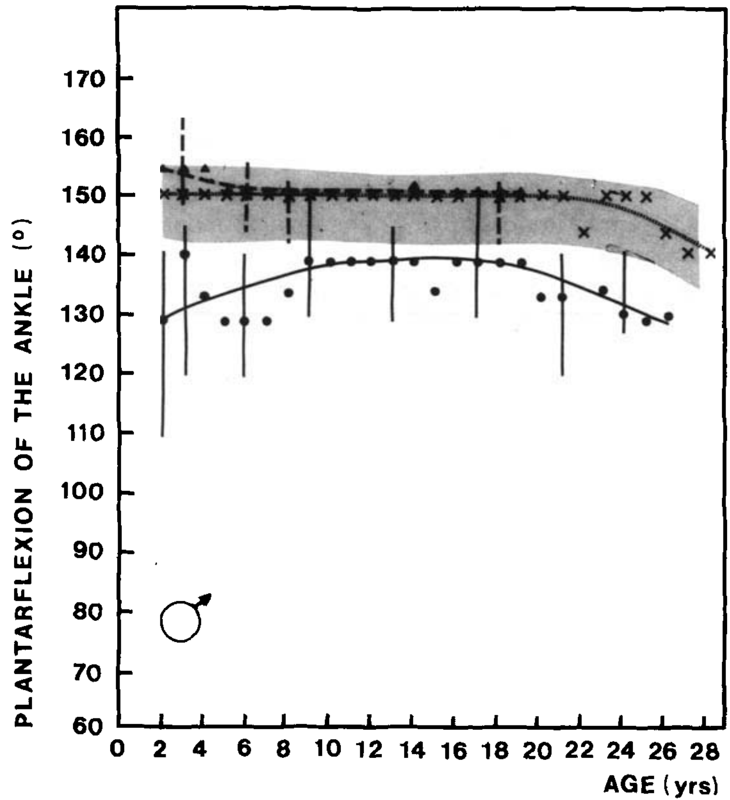


Figure 50. Dependence of the plantarflexion of the ankle on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

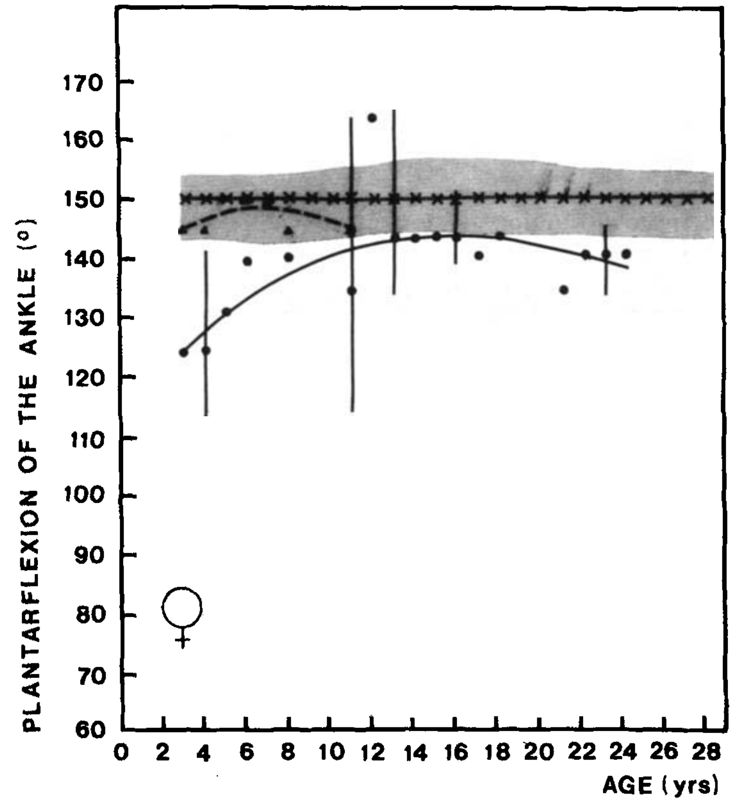


Figure 51. Dependence of the plantarflexion of the ankle on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

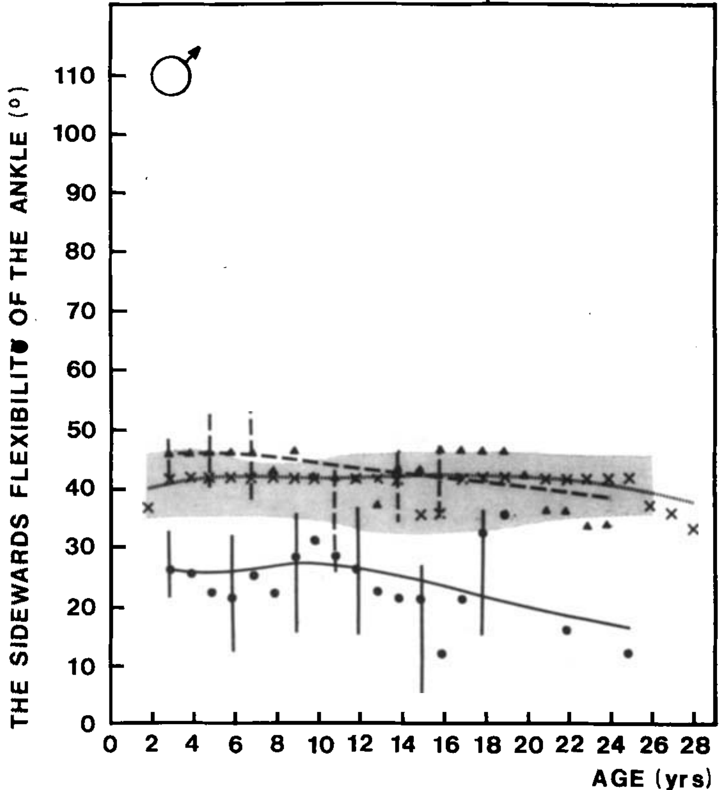


Figure 52. Dependence of the sidewards flexibility of the ankle on age at follow-up, boys:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

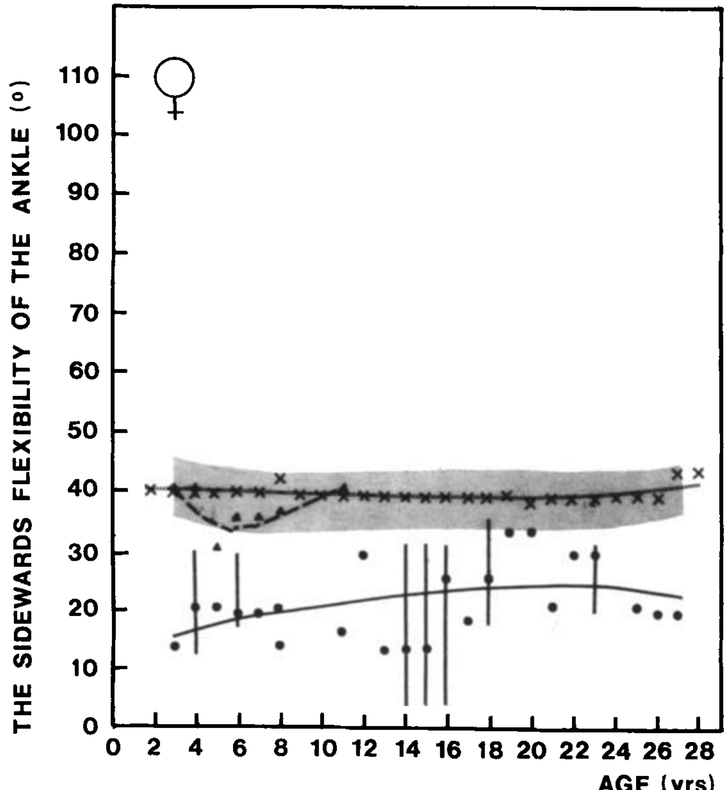


Figure 53. Dependence of the sidewards flexibility of the ankle on age at follow-up, girls:

CLUBFEET

THE PATIENTS' HEALTHY LEGS

LEGS OF THE CONTROL GROUP

5.7.1 Comments

Limitations of size and mobility in TEV appeared especially well in the length of the foot, the circumference of the calf, the sizes of the measured talar bones: talus, calcaneum, cuboid, navicular and M I, the dorsi- and plantarflexion of the ankle, squatting and standing on the toes, as well as in the sidewards flexibility of the ankle.

The circumference of the thigh in the clubfeet and healthy feet of unilateral cases as well as the circumference of the calf in the healthy legs of unilateral cases exceeded the corresponding values in the controls. No other hypertrophies stimulated by TEV or its treatment were observed. One must, however, take into account that it was not possible to gather a radiological control material.

A trend to decline in the older age groups was observed in some of the curves. This could be combined with the delay in operation in the older age groups or, especially in girls, with the individual variation within the tiny age groups of older patients. However, with the exception of the plantarflexion of the ankle, no similar trend was observed in the controls.

A trend to decline in the older age group which could be explained in the same manner was observed in squatting (in contrast to the controls) and pains (in contrast to the controls, whose growing aches probably vanished) as well. Concerning shoes, the situation became easier with time (explanation: the young ones were still under therapy).

The reason why the tibial epiphysis was almost significantly closer to normal in the older age groups remains obscure.

That the older patients got poorer final scores in size and shape at the follow-up could again be associated with delay in operating. In this respect the score in function seemed to be less sensitive.

An alternative explanation could be the generally increasing individual size in the population (which, however, was not observed in the controls) or the continuous noxious effect of therapy or the primary etiologic factor (the two last possibilities could not be properly examined in the unfortunate absence of individual growth curves).

As the early operations accumulated in the younger age groups at follow-up, a question also arose as to the influence of different follow-up times upon the final scores achieved. An attempt was made to clear up the matter by considering the scores within smaller age groups (2—7, 8—13, 14—19 and over 20 years of age). The groups, however, became too small to reveal any significant trend.

5.8 Dependence of information, variables, and scores on primary grade of TEV

No correlation was observed between the original quantities of the healthy feet and the degree of the TEV in the patients with unilateral clubfeet.

The correlation between the data at follow-up and the primary degree of the feet was tested using grades 1—4 i.e. the healthy feet included, as well as grades 2—4 i.e. the clubfeet only. The results are presented in Table 20.

Table 20. Correlation of the data at follow-up to the primary grade of the TEV as the latter turns more severe.

Variable	Using grades 1—4 Correlation	Using grades 2—4 Correlation
Length of the leg	*	*
Length of the foot	decrease $p<0.005$	*
Breadth of the foot	*	*
Circumference of the thigh	*	*
Circumference of the calf	decrease $p<0.005$	*
The talar index	decrease $p<0.001$	decrease $p<0.025$
The calcaneal index	decrease $p<0.005$	*
The cuboid index	*	*
The navicular index	*	*
The M I index	*	*
The skin quality	*	*
Pain	increase $p<0.001$	*
Fatigue	increase $p<0.001$	*
Shoes	decline $p<0.001$	decline $p<0.001$
Dorsiflexion of the ankle	decrease $p<0.001$	decrease $p<0.001$
Plantarflexion of the ankle	decrease $p<0.001$	decrease $p<0.005$
Squatting	decline $p<0.001$	decline $p<0.001$
Standing on the toes	decline $p<0.001$	decline $p<0.001$
Sidewards flexibility	decrease $p<0.001$	decrease $p<0.005$
Daily life	decline $p<0.001$	decline $p<0.005$
The talar class	decline $p<0.001$	decline $p<0.025$
The tibial epiphysis	decline $p<0.001$	*
Talocalcaneal index	decrease $p<0.001$	*
The T/M I angle	increase $p<0.005$	*

* No correlation

continues

Table 20. continued

Variable	Using grades 1—4 Correlation	Using grades 2—4 Correlation
The C/M V angle	increase p<0.001	increase p<0.025
The T/Nav angle	increase p<0.005	*
The calcaneal varus/valgus	to varus p<0.001	to varus p<0.005
The fibular retroposition	*	*
Vault of the foot	decrease p<0.001	*

*No correlation

Psychosocial aspects, reflecting the patients own and the other peoples' attitude to his treated TEV, were not dependent on the primary grade of the TEV.

In regard to the final scores there was a significant correlation of size and function to the primary grade of TEV ($p<0.010$ and $p<0.001$, respectively). Concerning shape, the dependence was almost significant ($p<0.050$). The more severe the case, the poorer the result. Details are presented in Tables 21, 22 and 23.

Table 21. Dependence of the score in size on the primary grade of TEV.

Grade	Score in size 71 — Number of feet	Score in size 81 — Number of feet	Score in size 91 — Number of feet	Score in size 101 — Number of feet	Total number of feet
2.	0	1	4	7	12
3.	22	26	32	10	90
4.	7	13	10	3	33
Total	29	40	46	20	135

d.f. 6, Chi-square 21.08 *Interpretation: $p<0.01$*

Table 22. Dependence of the score in function on the primary grade of TEV.

Grade	Score in function 61 — Number of feet	Score in function 71 — Number of feet	Score in function 81 — Number of feet	Score in function 91 — Number of feet	Total number of feet
2.	0	2	3	7	12
3.	24	29	28	9	90
4.	19	11	2	1	33
Total	43	42	33	17	135

d.f. 6, Chi-square 38.59 *Interpretation: $p<0.001$*

Table 23. Dependence of the score in shape on the primary grade of TEV.

Grade	Score in shape 61 — Number of feet	Score in shape 71 — Number of feet	Score in shape 31 — Number of feet	Total number of feet Number
2.	0	5	7	12
3.	16	36	38	90
4.	13	11	9	33
Total	29	52	54	135

d.f. 4, Chi-square 9.919 *Interpretation $p<0.05$*

5.8.1 Comments

The correlation of the measured variables to the primary grade of TEV depended on whether it was evaluated including or excluding the healthy legs in unilateral cases. That the correlation was more significant with the healthy legs included, reflects the definite aberrancy of even the milder, postural clubfeet.

Of the measured variables representing the size of the leg neither the length of the leg, the breadth of the foot, the circumference of the thigh, the sizes of the navicular, cuboid, and M I, nor the skin quality were dependent on the primary grade of TEV.

All of the measured variables representing the function of the foot correlated to the primary grade.

Of the measured variables representing the shape of the foot only the fibular retroposition did not correlate to the primary grade.

The fact that the most typical variables of the clubfoot correlated to the primary grade of the deformity in a reasonable way, i.e. the result being the poorer the more severe the primary situation, and the incidence of grade 2, seem to indicate the adequacy of the performed grading of the primary degree.

Concerning the final scores, which were of course estimated only in clubfeet, the correlation to the primary grade of TEV was significant concerning size and function and almost significant in regard to shape. This fact clearly reflects how far we are from an ideal model of therapy and excellent results in the case of TEV.

5.9. Dependence of information, variables, and scores on patients' sex

The primary grade of TEV did not correlate to the sex of the children (Table 14, page 46). Nor was any correlation of age, age at operation, type of therapy or complications to sex observed.

There was a natural dependence on sex of the metric and planimetric quantities, as becomes evident in Figures 14—33, pages 52—61.

Concerning the variables representing shape no evident correlation to sex existed (Figures 34—47, pages 62—68).

The functional variables did not show any correlation to sex (Figures 48—53, pages 69—71).

With regard to the final scores the dependence of size on sex was significant ($p<0.001$), the result in boys being definitely poorer as will be seen from Table 24, below. No correlation to sex was observed in respect of function and shape.

Table 24. Dependence of the score in size on the sex of the patients.

Sex	Score in size 71 — Number of feet	Score in size 81 — Number of feet	Score in size 91 — Number of feet	Score in size 101 — Number of feet	Total number of feet
Boys	29	32	29	11	101
Girls	0	8	17	9	34
Total	29	40	46	20	135

d.f. = 133 t = 3.917 *Interpretation: $p<0.001$*

Psychosocial aspects, reflecting the patient's own and the other peoples' attitude to his treated TEV, were not dependent on sex.

5.9.1 Comments

The only difference between boys and girls in primary status and final result that was statistically significant was the superiority of girls concerning the final score in size. The reason for this difference remains obscure.

It might, however, be mentioned that there were, to the disadvantage of the girls, parallel trends concerning the reoperation rate, the number of complications, the incidence of bilateral and grade 4 feet, and the number of associated anomalies. Separately, no one of these trends reached statistical significance.

5.10 Dependence of information gathered and scores on therapy

The final scores in size, fuction and shape were independent of complications in operative and conservative therapy, as is shown in Tables 25, 26 and 27.

Table 25. Dependence of the score in size on complications in therapy.

Compli-cation	Score in size 71 — Number of feet	Score in size 81 — Number of feet	Score in size 91 — Number of feet	Score in size 101 — Number of feet	Total number of feet
Conservative	3	1	1	1	6
Operative	0	5	6	0	11
Total*	3(29)	6(39)	7(42)	1(13)	17(123)

d.f. 2, Chi-square 4.595 *Interpretation: No dependence*

*The total number of feet in each group is given in brackets.

Table 26. Dependence of the score in function on complications in therapy.

Compli-cation	Score in function 61 — Number of feet	Score in function 71 — Number of feet	Score in function 81 — Number of feet	Score in function 91 — Number of feet	Total number of feet
Conservative	1	4	1	0	6
Operative	5	4	2	0	11
Total*	6(43)	8(40)	3(30)	0(10)	17(123)

d.f. 2, Chi-square 0.534 *Interpretation: No dependence*

*The total number of feet in each group is given in brackets.

Table 27. Dependence of the score in shape on complications in therapy.

Complication	Score in shape 61 — Number of feet	Score in shape 71 — Number of feet	Score in shape 81 — Number of feet	Total number of feet
Conservative	1	5	0	6
Operative	3	4	4	11
Total*	4(29)	9(47)	4(47)	17(123)

d.f. 2, Chi-square 1.7771   *Interpretation: No dependence*

***The total number of feet in each group is given in brackets.**

There was an obvious correlation of the primary grade of TEV to the type of therapy, the milder cases having been treated more conservatively. The correlation was almost significant if only grades 3 and 4 were considered. The group of feet treated with a primary operation consisted of more severe cases than the group treated with a delayed operation. The details are presented in Table 28.

Table 28. Dependence of type of therapy on primary grade of TEV.

Type of therapy	Grade 2 Number of feet	Grade 3 Number of feet	Grade 4 Number of feet	Total number of feet
Primary operation	1	27	17	45
Pure conservative	11	22	2	35
Conservative + delayed operation	0	41	14	55
Total	12	90	33	135

d.f. 4, Chi-square 30.73   *Interpretation: Obvious dependence*

There was an almost significant correlation of the age at the only operation to the final score in size. There was an almost equal but not significant trend in favour of the earlier operations concerning function and shape, as shown in Table 29, on the next page.

Table 29. Dependence of mean scores on the age at the only operation.

Age at the only operation	Mean score in size	S.D.	Mean score in function	S.D.	Mean score in shape	S.D.	Number of feet
1 week	91.3	7.4	78.6	10.2	81.0	6.1	33
1 week—1 year	92.9	5.2	74.9	9.4	79.1	9.2	17
>1 year	84.0	15.3	73.4	9.0	76.7	8.4	24
Total							74
d.f. 2, 71	*F=4.850 p<0,05*		*F=2.161 no significance*		*F=2.151 no significance*		

The quality of the primary conservative therapy did not significantly affect the score in function but correlated to the scores in shape and size. In the four cases of forceful manipulation the scores were poor for shape and function. The details are presented in Table 30.

Table 30. Dependence of the final scores on the type of primary conservative therapy in grade 3 and 4 feet.

Primary conservative therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Gentle	75	75.0	8.5	75.8	10.0	86.2	12.3
Forceful	4	71.5	16.9	67.3	6.4	91.3	10.2
None	44	79.6	7.8	75.6	10.7	91.6	7.9
Total	123						
d.f. 2, 120		*F=4.830 p<0.01*		*F=1.36 no significance*		*F=3.769 p<0.05*	

Concerning grades 3 and 4 the correlation of the scores in size and shape to the type of therapy was significant ($p<0.01$). The scores were best in the primarily operated, second best in the conservatively treated and poorest in cases treated conservatively combined with a delayed operation. With regard to function the correlation was also significant ($p<0.01$), the results being best in the conservatively treated group and poorest with the combination of conservative therapy and delayed operation. (Reservation: the scores in the conservatively treated cases were an outcome of selection, free from the burden of the poorest cases which have been treated with a delayed operation, as pointed out on page 39).
Details are presented in Table 31, overleaf.

Table 31. Dependence of the final scores on the type of therapy in grade 3 and 4 feet.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	44	79.6	7.8	75.6	10.7	91.6	7.2
Pure conservative	24	75.9	7.2	81.8	9.3	90.8	10.0
Conservative + delayed operation	55	74.3	9.7	72.6	9.0	84.6	12.6
Total	123						
d.f. 2, 120		*F=4.816* *p<0.01*		*F=7.437* *p<0.01*		*F=6.403* *p<0.01*	

When the interdependence of the scores and type of therapy was considered within grade 3, the same trend was observed. The correlation was significant concerning shape and function and almost significant in the case of size ($p<0.025$, $p<0.010$ and $p<0.050$, respectively). The details are presented in Table 32, below. (Obs. The same reservation as concerning Table 31).

Table 32. Dependence of the final scores on the type of therapy in grade 3 feet.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	27	81.8	6.8	79.6	9.4	92.4	7.2
Pure conservative	22	76.3	7.4	82.0	8.9	90.3	10.4
Conservative + delayed operation	41	75.8	9.3	73.5	9.7	85.7	12.4
Total	90						
d.f. 2, 87		*F=4.894* *p<0.025*		*F=6.762* *p<0.01*		*F=3.499* *p<0.05*	

The results of the primary operative therapy were also compared with the combined results of the two other types of therapy. The distribution of the grade 3 and 4 feet into these two groups was 27/17 and 63/16, respectively. The scores in function, shape, and size were superior in the cases treated with a primary operation irrespective of whether they were examined in the grade 3 cases only or with the grade 4 cases included. Details are presented in Tables 33 and 34.

Table 33. Dependence of the final scores on the type of therapy in grade 3 feet.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	27	81.8	6.8	79.6	9.4	92.4	7.2
Pure conservative / Conservative + delayed operation	63	75.9	8.6	76.5	10.2	87.3	11.8
Total	90						
d.f. 88		*t=3.103* *p<0.0025*		*t=1.360* *no significance*		*t=2.035* *p<0.025*	

Table 34. Dependence of the final scores on the type of therapy in grade 3 and 4 feet.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	44	79.6	7.8	75.6	10.7	91.6	7.2
Pure conservative / Conservative + delayed operation	79	74.8	9.0	75.4	10.0	86.5	12.2
Total	123						
d.f. 121		*t=2.989* *p<0.0025*		*t=0.093* *no significance*		*t=2.566* *p<0.01*	

The results were also considered within grade 3 and solely concerning cases treated with a posteromedial release operation. A comparison was made between primary operative therapy and conservative therapy combined with a delayed operation. The scores were significantly better with a primary operation in respect of size and function. Concerning shape the same trend was observed, but it did not reach statistical significance. Details are presented in Table 35, overleaf. (Obs. The same reservation as concerning Table 31).

Table 35. Comparison of the scores in cases treated either with a primary posteromedial release operation or conservatively with a delayed posteromedial release operation within grade 3.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	26	81.6	6.9	79.1	9.2	91.7	6.2
Conservative + delayed operation	24	78.2	8.0	73.1	10.1	84.7	12.8
Total	50						
d.f. 48		*t=1.59 no significance*		*t=2.158 $p<0.025$*		*t=2.433 $p<0.01$*	

Comparison was also made between the scores in cases treated either with primary operation or conservatively, within grade 3. The superiority of the primary operative treatment was significant in the case of shape ($p<0.01$). There was a trend favoring the primary operation in regard to size and conservative therapy concerning function, but it did not reach statistical significance. Details are presented in Table 36, below. (Obs. The same reservation as concerning Table 31).

Table 36. Comparison of the scores in cases treated either with primary operation or conservatively, within the grade 3.

Type of therapy	Number of feet	Mean score in shape	S.D.	Mean score in function	S.D.	Mean score in size	S.D.
Primary operation	27	81.8	6.8	79.6	9.4	92.4	7.2
Pure conservative	22	76.3	7.4	82.0	8.9	90.3	10.4
Total	49						
d.f. 47		*t=2.660 $p<0.01$*		*t=0.862 no significance*		*t=0.799 no significance*	

The difference in scores between patients operated once and those who underwent two or more operations was considered within grade 3. The scores, altogether, were poorer in the latter group, as presented in Table 37, on the next page.

Table 37.Comparison of scores in cases treated with a single operation and those undergoing two or more operations, within grade 3.

Number of operations	Number of feet	Mean score: size	S.D.	Mean score: function	S.D.	Mean score: shape	S.D.
1	53	89.8	10.1	77.6	9.6	80.1	7.9
>2	15	83.3	13.0	70.3	9.8	71.2	8.8
Total	68						
d.f. 66		$t=2.013$ $p<0.025$		$t=2.571$ $p<0.01$		$t=3.718$ $p<0.001$	

The influence of the timing of the operation on the reoperation rate was considered within grade 3 treated with either a posteromedial release or some other type of operation. The result is presented in Table 38.

Table 38. Dependence of the reoperation rate on the timing of the operation in grade 3 feet.

Age at first operation	<1 week	1week-1year	>1 year	Total
Posteromedial release (number of feet)	22	12	16	50
Reoperated (number of feet)	—	2	5	7
Rate (per cent)	0	17	31	14
Other operations (number of feet)	2	5	11	18
Reoperated (number of feet)	—	4	4	8
Rate (per cent)	0	80	36	33
All operations (number of feet)	24	17	27	68
Reoperated (number of feet)	—	6	9	15
Rate (per cent)	0	35	33	22

The correlation of type of therapy to reoperation rate was also considered within grade 3 feet treated with either a posteromedial release or some other type of operation. The result is presented in Table 39.

Table 39. Dependence of reoperation rate on type of therapy in grade 3 feet.

Operation	Primary operation	Conservative	Conservative + delayed operation	Total
Posteromedial release (number of feet)	26	—	24	50
Reoperated (number of feet)	1	—	6	7
Rate (per cent)	4	—	25	14
Other operations (number of feet)	1	—	17	18
Reoperated (number of feet)	—	—	8	8
Rate (per cent)	0	—	47	44
All operations (number of feet)	27	—	41	68
Reoperated (number of feet)	1	—	14	15
Rate (per cent)	4	—	34	22

Psychosocial aspects, reflecting the patient's own and the other peoples' attitude to his treated TEV, correlated to the score in function but not to the score in size and shape, as shown in Table 40, on the next page.

Table 40. Dependence of psychosocial aspects on final scores.

Psychosocial aspects*	Number of feet	Mean score in size	S.D.	Mean score in function	S.D.	Mean score in shape	S.D.
3. Sports and games limitation	2	88.5	6.7	64.0	0.0	68.0	2.8
4. Unpleasant notice attracted	19	89.1	9.9	71.0	9.8	73.4	10.2
5. No harm at all	114	89.9	12.2	77.8	10.5	77.5	8.3
Total	135						
d.f. 2, 132		*F=0.625, no significance*		*F=5.055 p<0,01*			*F=2.890 no significance*

• The grades are explained in the Appendix, Table 43, page 107.

The final scores in the postural clubfeet, i.e. grade 2, were surveyed. All cases except one (which was excluded from the table) were treated conservatively. The scores were higher than in other groups considered previously but, lower in function and shape than in size. The figures are presented in Table 41.

Table 41. The final scores attained with conservative therapy in postural clubfeet.

Number of feet	Mean score: size	S.D.	Mean score: function	S.D.	Mean score: shape	S.D.
11	105.6	9.7	87.9	6.8	83.0	4.6

5.10.1 Comments

That neither score in size of the leg nor scores in function or shape of the foot correlated to the complications in either operative or conservative therapy contributed to the comparability of the types of therapy.

As grade 4 included more primarily operated and fewer conservatively treated cases than grade 3 and as the grade 2 feet were mostly conservatively trea-

ted, the correlation of the final scores to the type of therapy was assessed using grades 3 and 4 as well as grade 3 only. The latter method was appropriate for the estimation of the dependence of the result solely on the type of therapy.

When the influence of the type of primary conservative therapy was considered in grade 3 and 4 feet, a trend towards better scores in shape and size was observed if there was no preoperative conservative threrapy ($p<0.01$ and $p<0.05$, respectively).

The dependence of scores on the type of therapy in grade 3 and 4 feet and in grade 3 feet only behaved in almost like manner, the scores in size and shape being better in the primarily operated feet, while the score in function was in favour of conservative therapy. Delayed operation gave poorest results in all respects. When the results are compared concerning primary and delayed operations one must be aware that the share of grade 4 feet was higher in the former type of therapy.

Comparison was also made between the primary operative and the conservative type of therapy within grade 3. The scores in size and shape were better with the former and those in function with the latter type of therapy. The difference was significant only concerning shape.

It must, however, be mentioned that the scores in conservative therapy were an outcome of selection, free from the burden of the poorest cases which had resulted in a delayed operation.

As the scores achieved with primary operative therapy were compared with the combined scores in conservative therapy and conservative therapy combined with a delayed operation, all scores indicated the favourability of primary operative therapy. The superiority of primary operative therapy was significant concerning size and shape. This result was not dependent on whether it was examined within grade 3 only or grade 4 included. It might also be mentioned that the share of grade 4 feet was higher in the cases treated with a primary operation.

Without reserve it could be established that the conservative therapy was not as much inferior to the primary operative therapy in regard to function as it was concerning shape and size.

When the results were considered in grade 3 feet treated with a posteromedial release operation, all scores were higher in the primarily operated cases. The difference was not significant in respect of shape.

In grade 3 feet, the first operation failed in 22 per cent. Generally, the result could not be improved to the level of a successful first operation by further operations. *The primary operation failed in 4 per cent only.*

The influence of the timing of the operation on the final scores was considered in feet treated with a single operation. A trend in the scores for function and shape to decline with delay of operation was observed, while the difference was almost significantly in favour of operation at the age of 1 week—1 year in the case of size.

Patients were reoperated mainly because of unsatisfactory function and shape. The dependence of the reoperation in grade 3 feet on the timing of the operation and on the type of therapy, which appeared especially well in cases treated with a posteromedial release operation, seemed to speak for early and primary operative therapy. *No reoperations were needed in feet operated at the age of less than one week.*